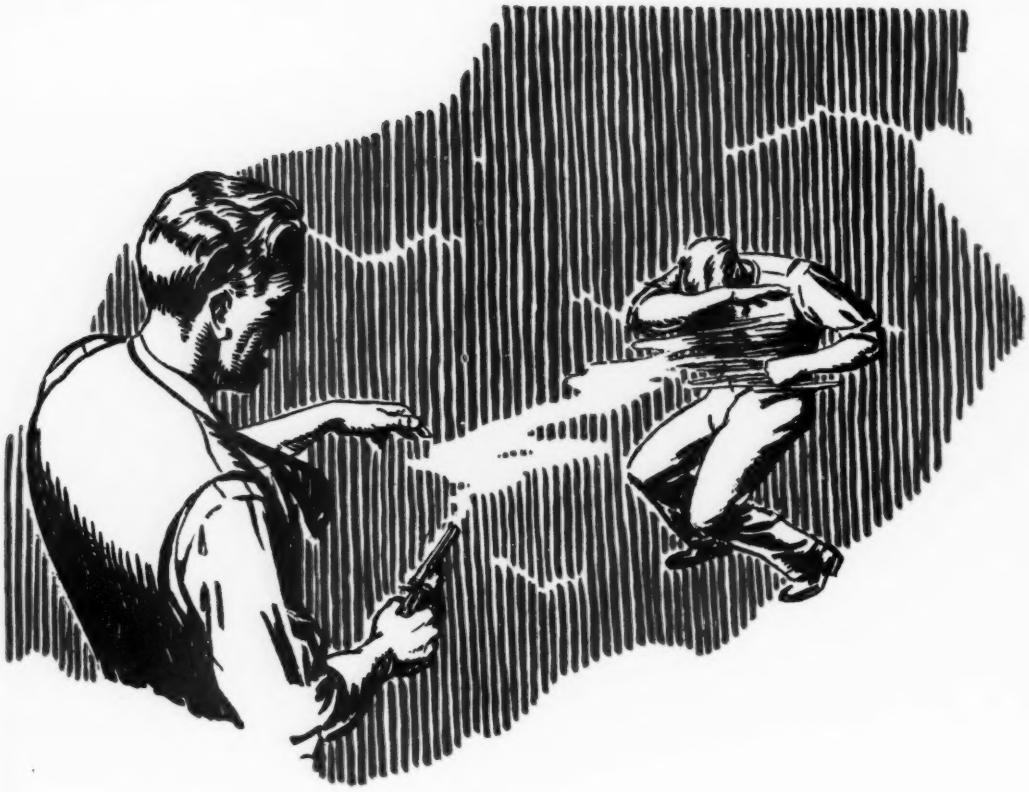
The MINING CONGRESS JOURNAL

ACCIDENT PREVENTION WORK at the Phelps Dodge Corporation

By **H. C. Henrie**

JULY, 1931



HE "DIDN'T KNOW IT WAS LOADED"

HOW many tragedies are explained by these words —and how futile they are in comforting the families of the victims.

Similar tragedies are all too common in coal mines when ignorant or foolhardy individuals violate rules that have been established for the protection of themselves and their associates. Many years of close association with the mining industry have convinced us that more rigid enforcement of safety rules is a fundamental necessity—especially in connection with the use of explosives.

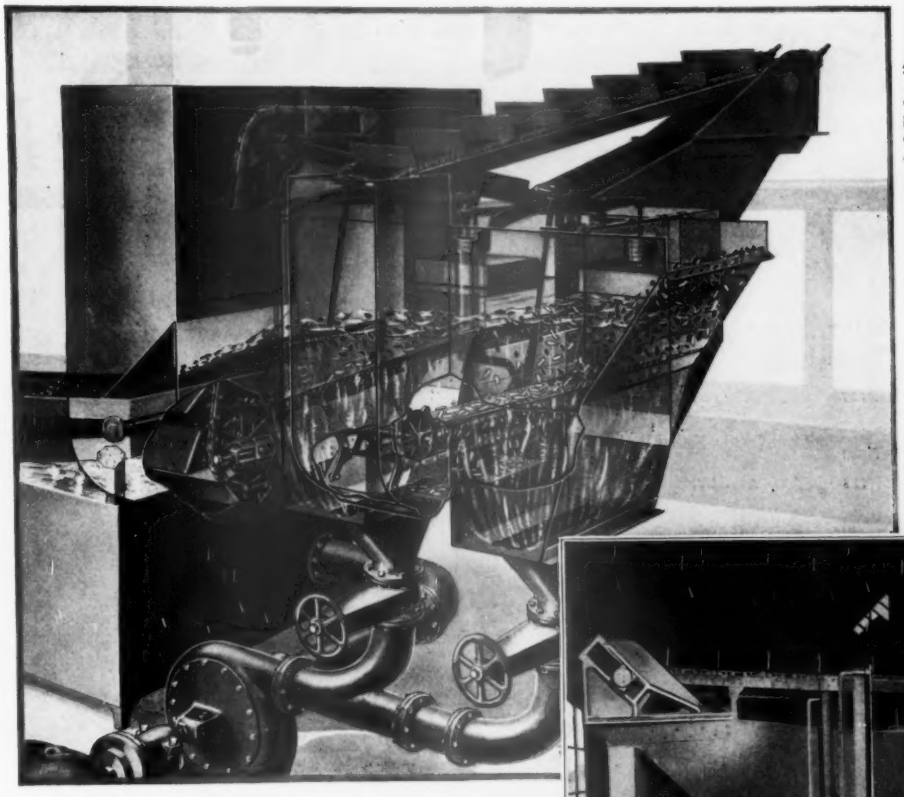
Mine officials must stand firmly against any let-down in the enforcement of safety regulations; and give no man an excuse for saying—after a tragedy has occurred—that the safety rules were commonly violated; or that he *"didn't know"* about the danger of his action.

Do Not "Short Fuse" —Fuse should be cut long enough for the end to extend well out of the mouth of the bore hole when the primer cartridge is in place.

All holes should be well tamped.

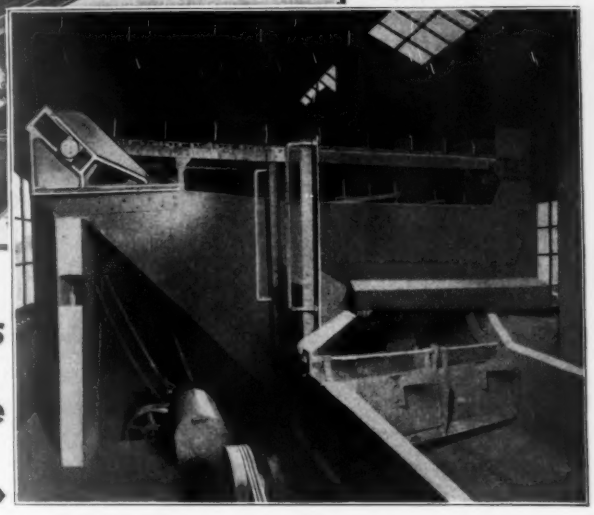
THE ENSIGN-BICKFORD CO. 1836 SAFETY FUSE 1931 SIMSBURY, CONN.

THE ENSIGN-BICKFORD CO.
SIMSBURY CONNECTICUT



A phantom view of the Twin Tandem Hydro-Separator, a unit of extremely large capacity, showing method of cleaning and separating coal and refuse.

Installation of a Twin Tandem Hydro-Separator at the Island Creek Coal Company's Holden, West Virginia Mine. One hundred and fifty tons per hour of 2" x ½" screenings are cleaned and prepared.



Cleaner Coal and *Bigger Profits* Are Now Available to the Smallest Treasuries! » » »

Exhaustive tests have proved an effectiveness for the Tandem Hydro-Separator far beyond expectations. The most stubborn coals give up their refuse and bone in this re-washing unit, with a minimum sacrifice of combustible product.

The Tandem Hydro-Separator is an important element in the RandS Process of Coal Cleaning which assures the highest technical efficiency at surprisingly low cost.

It is made in two types, the Tandem Hydro-Separator for small capacities and the Twin Tandem for large capacities.

Let our engineers show you unbiased production figures on the actual operation accomplishments of these units.

RandS Service includes counsel, engineering, contracting and erection of equipment for handling coal from the mine to the railroad car.

"Consultation Without Obligation."

ROBERTS AND SCHAEFER CO.

ENGINEERS and CONTRACTORS

PITTSBURGH, PA., 418 OLIVER BLDG. WRIGLEY BUILDING, CHICAGO HUNTINGTON, W. VIRGINIA, 514 NINTHAVE.

THE MINING CONGRESS JOURNAL

VOLUME 17 JULY, 1931 No. 7

Contents

EDITORIALS

Against the Public Welfare..... 327
Gold, Money and Credit..... 327
An American Plan..... 328
Coal Freight Rates..... 328
Safe Transportation..... 328
A Fertile Field..... 329
To Arms! 329

FEATURE ARTICLES

Brains as a Natural Resource—By Dudley V. Haddock..... 330

Modern Face Preparatory Operations—By G. B. Southward..... 332

Progress of Coal Mine Mechanization in Foreign Countries—By W. H. Rastall..... 334

Accident Prevention Work at the Phelps Dodge Corporation—By H. C. Henrie..... 345

DEPARTMENTS

REPORTS ON THE MECHANIZATION SURVEY 332
PRACTICAL OPERATING MEN'S DEPARTMENT, COAL 334
PRACTICAL OPERATING MEN'S DEPARTMENT, METAL 345
NEWS OF THE MINING FIELD..... 351
WITH THE MANUFACTURERS..... 363

Practical Operating Men's Department

COAL

Progress of Coal Mine Mechanization in Foreign Countries

METAL

Accident Prevention Work at the Phelps Dodge Corporation

Published Every Month by The American Mining Congress, Washington. D. C.

Edited under the supervision of James F. Callbreath, Secretary of The American Mining Congress

E. R. COOMBES, *Editor*

GUY N. BJORGE, *Associate Editor*
ERNEST H. PULLMAN, *Legislative Editor*
WALTER LUKEI, *News Editor*
F. E. PRIOR, *Art Editor*
NEWELL G. ALFORD, *Associate Editor*
J. M. HADLEY, *Business Manager*
PARKER COTT, *Field Representative*
FRANK W. MORAN, *Field Representative*

Copyright 1931 by The American Mining Congress. Entered as Second Class Mail Matter January 30, 1915, at the Post Office at Washington, D. C.
Published 13 times annually—the 1st of each month and the 21st of July
YEARLY SUBSCRIPTION, UNITED STATES AND CANADA, $3.00
FOREIGN, $4.00; SINGLE COPIES, $0.50

No. 10 of a series of advertisements on "How Superlative Quality is Built into Roebling Wire Rope"

Nothing is left to Chance

NOT even a single wire in a reel of Roebling Steel Wire Rope is an "unknown quantity." Even years after shipment, its complete manufacturing history is retained in the Roebling files. At any time, Roebling can trace right back to the very heat of steel from which the wire was made.

In the testing laboratories, a typical view of which is shown above, *every* bundle of wire is painstakingly tested. Gauging, tension, torsion and elongation tests are made on samples of wire clipped from each bundle. No wire which does not meet the exacting Roebling standards is used for Roebling Wire Rope. For example, when testing the wire, only that which attains the very highest rating is set aside for stranding.

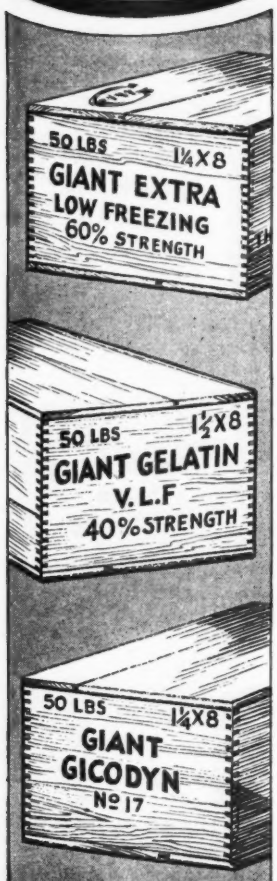
When you order a reel of Roebling you get more than merely so many feet of wire rope. You get predetermined quality, known stamina, safety—of the highest degree.

JOHN A. ROEBLING'S SONS COMPANY
TRENTON, N. J. *Branches in Principal Cities*
WIRE · WIRE ROPE · WELDING WIRE · FLAT WIRE · COPPER AND INSULATED WIRES AND CABLES · WIRE CLOTH AND WIRE NETTING
Export Dept.—New York, N.Y.

ROEBLING **WIRE ROPE**

"BLUE CENTER" STEEL

GIANT



. . . Checked and approved by America's great mines for

PERFORMANCE

based on a thorough knowledge of the users' requirements under varying conditions.

DEPENDABILITY

that saves time and safeguards operators.

QUALITY

the result of improved formulas and the use of the best ingredients.

UNIFORMITY

insured by daily scientific tests.

ECONOMY

that is always found in the use of ideal products.

Let us assist you in the selection of the proper grade for your mine. Write nearest branch.

•

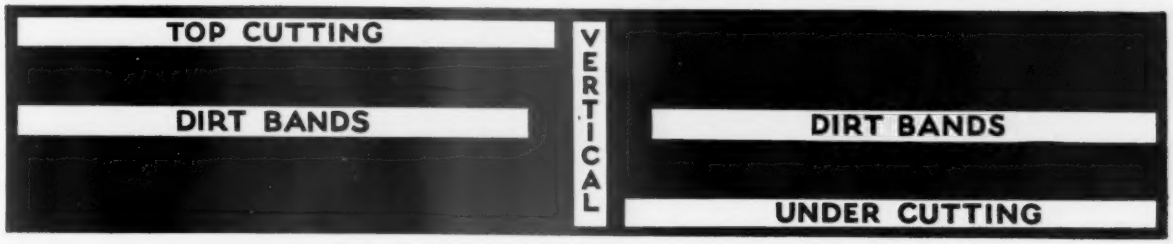
The GIANT POWDER Co., Con.

Crocker First National Bank Building
San Francisco, California

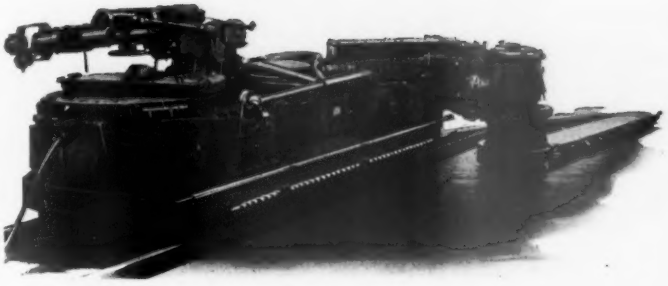
BRANCH OFFICES: Butte, Mont., Seattle, Wash., Salt Lake City, Utah, Portland, Ore., Spokane, Wash., Los Angeles, Calif.

•

GIANT EXPLOSIVES ....EVERYTHING FOR BLASTING



Jeffrey 29-E Arcshear



Jeffrey 29-E Arcshear Machine with cutter bar arranged for bottom cutting in narrow place. Note how it is possible to rest bar directly on the bottom of floor. Single drill is shown mounted on top of machine.

Jeffrey 29-E Arcshear Machine with cutter bar arranged for shearing cut. *The only combination machine that makes a shearing cut on a curve.*

The Jeffrey 29-E Arcshear is a machine for making both vertical and horizontal cuts. It can be furnished for cutting horizontal kerfs at the bottom or top of a coal seam—or for cutting out a dirt band between the bottom and top.

Important features are its ability to follow an irregular contour of bottom, top or dirt band and *the bottom cutter's ability to cut directly on the bottom in narrow places.* The cutter head is mounted on three screws, *adjustable by power while machine is operating.* This three-point suspension permits tilting the cutter bar in any direction so as to easily follow the irregularities of bottom, top or dirt band.

For shearing, the manipulation of the cutter bar on the 29-E is simple. The bar is raised and lowered through self-locking gearing and will remain in any position in which it may be left. Clamping and releasing of the cutter bar to make a sumping cut is unnecessary. The feed of the cutter bar is affected by neither hardness of coal nor action of gravity —uniform cutting is maintained by a positive vertical feed.

The Arcshear is the only combination machine that will make a shearing cut on a curve.

The 29-E Arcshear Machine is permanently mounted on self-propelled truck. It can be equipped with one or two independently power-operated drills.

Complete data will be sent on request.

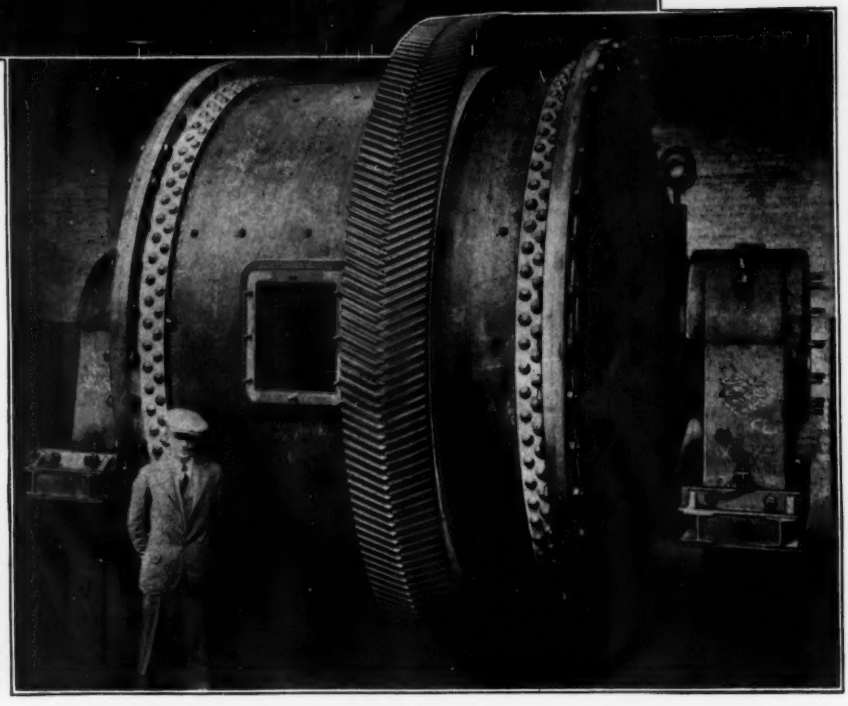
The Jeffrey Manufacturing Company

958-99 North Fourth St., Columbus, Ohio

BRANCH OFFICES. New York Philadelphia Pittsburgh Scranton, Pa. Huntington, W. Va. Chicago Denver Salt Lake City Birmingham
SALES AND SERVICE STATIONS: Pittsburgh, 600 Second Avenue Scranton, 122 Adams Avenue Terre Haute, Ind., 319 Cherry Street
Price, Utah, 52 North Second West Street Birmingham, Ala., 1911 Ave. A. Winchester, Ky., 122 North Main Street
Salt Lake City, 153 West Second South Street Fort Smith, Ark., 217 South Fifth Street
Jeffrey Manufacturing Co., Ltd., of Canada. *Head Office and Works*, Montreal; *Branch Office*, Toronto; *Service Station*, 210 Ninth Ave., W. Calgary

JEFFREY COAL MINE EQUIPMENT

9′ x 12′ Rod Mill for Nevada Consolidated Copper Company.



One of six 10′6″ x 8′ Ball Mills for Miami Copper Company.

Grinding Mills *of* Record Size

LARGE size units lower production costs. That is why the leaders in the mining industry are adopting large mills.

The two mills shown above exemplify Allis-Chalmers leadership in developing and building large mills. The demonstrated success of these mills in daily operation again proves the soundness of design and construction and the high quality of workmanship and materials in Allis-Chalmers grinding mills.

Let Allis-Chalmers engineering experience and unsurpassed manufacturing facilities be of service in reducing your grinding costs.

ALLIS-CHALMERS

Allis-Chalmers Manufacturing Company, Milwaukee

More holes to the blast.. Fewer misfires!

with these new *and* improved BLASTING MACHINES

Developed by General Motors for du Pont, these new blasting machines are now offered to save you money in blasting operations!

The NEW du Pont No. 5 Blasting Machine . . . known as the No. 5 G. M.—because it was designed by General Motors . . . has proved highly successful in many blasting operations where it is necessary to fire a large number of holes at one time.

Here are the special new features that will recommend No. 5 G. M. to you:

(1) A two-point clutch which makes it possible to send the current out on the firing line at its peak.
(2) A laminated armature and solid core field for building up the maximum current.
(3) A one microfarad condenser to store up the current until the moment of discharge.
(4) Most important of all, a new eight-point breaker of unique design which utilizes the current heretofore wasted as a large spark at the completion of the stroke.

Field windings on the new machine are so placed as to increase its efficiency. There are ball bearings on the armature shaft; and a thrust bearing for the rack bar in the direct line of the thrust instead of offset as formerly.

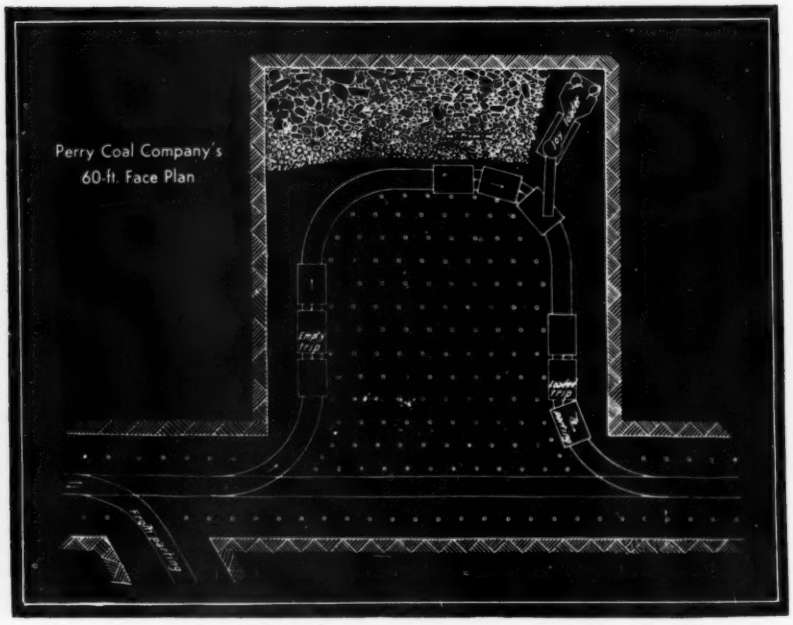
The new machine has a rated capacity of 100 electric blasting caps. As a matter of fact, it has often fired as many as 125 holes connected in series. The weight of this machine is a little less than 36 pounds.

In quarry and construction work, No. 5 G. M. has proved particularly useful. Its large volume of current at sufficient voltage reduces the chances of misfires from electric leakage.

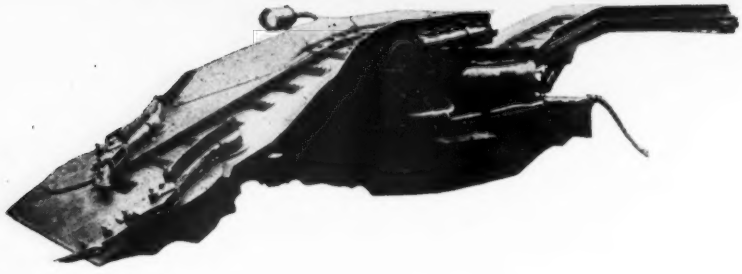
A number of the features from the No. 5 G. M. machine have been incorporated in the du Pont No. 2 and No. 3 Blasting Machines. These machines are now being manufactured with a two-point clutch, an eight-point breaker switch and a condenser. These improved machines materially reduce the chances of misfires in thirty- and fifty-hole shots.

E. I. DU PONT DE NEMOURS & CO., INC.
Explosives Department
WILMINGTON, DELAWARE

DU PONT
REG. U. S. PAT. OFF.



Keeping loaders at full capacity at Taylor Mine with ONE TON pit cars



CUTTING car changing delays to a minimum was a major consideration in working out a successful system for loading at the Taylor Mine of the Perry Coal Company of O'Fallon, Illinois. Mule gathering with one-ton mine cars on 24″ track was in use. How well this was adapted to Joy loading is described in the paper by Mr. C. J. Sandoe, delivered to the recent Coal Convention of The American Mining Congress. Our engineers can give much help in working out just such problems.

JOY MANUFACTURING CO., *Franklin, Penna.*

JOY

Let us make an analysis of the possibilities of Joy Loading at your mine.

An answer to the question:

"How can I REDUCE production costs?"

A MESSAGE TO THE MINING, QUARRYING, AND CONSTRUCTION INDUSTRIES ... *Second of a Series*

BY NECESSITY, every far-sighted executive today should be receptive to any program that will reduce production costs and increase operating efficiency.

ESPECIALLY attractive is a program that will accomplish these objectives immediately without increasing plant investment a single dollar.

SUCH an opportunity may be disclosed to you through an analysis of your blasting methods. Many mines and quarries are reducing blasting costs to a point previously considered impossible, by taking advantage of the remarkable progress that has been made in explosives development and blasting procedure in the last few years.

"*How can this reduce costs in my operations?*" you ask.

The answer is:

(1) Very often, it will be found that more efficient modern explosives can be used, in the same manner and with identical results as older-type powders, resulting in lower explosives costs.

(2) After selecting the most efficient explosives that can be used for a particular operation, even lower blasting costs often can be obtained by refinements in blasting practice.

INVESTIGATE THESE EXPLOSIVES VALUES

THE GELAMITES

No recent development in explosives has been more important than the Gelamites—new gelatin-type explosives that can satisfactorily replace gelatin dynamites under most conditions at a great saving. Every operator using gelatin should investigate the Gelamites.

THE HERCOMITES

The Hercomites continue to replace older types of dynamites on many blasting jobs because of their economy, performance, and added safety. Wherever suitable, they reduce explosives costs considerably.

HERCOALS AND RED H PERMISSIBLES

Red HC-L. F., Red HF- L. F., and the Hercoals were developed not only to provide added safety—but also to produce clean lump coal economically. So successful have they been that they now comprise a high percentage of permissible sales. If faster permissibles are necessary, Collier C, L. F., and Red HB-L. F. offer unusual value.

(3) Efficient blasting produces material properly broken for economical loading, crushing, or handling. This results in additional savings by eliminating excessive wear and tear on equipment, and by using personnel to best advantage.

TO HELP you in a cost-reducing program of this kind, the Hercules Powder Company has developed explosives suited for any blasting operation; and it has field engineers to assist in the proper selection and scientific application of these explosives.

AMONG the most recent and successful developments of Hercules research are the Gelamites and Hercomites, offering unusual explosives values for quarrying, construction, and metal and non-metallic mining. The Hercoals and Red H permissibles provide similar economies in coal mining.

BECAUSE of our experience in the development, selection, and application of explosives to every industry, we have a distinct service to offer users of explosives. An analysis of your blasting methods may indicate the value of this service to you especially because of present business conditions. Write to the nearest branch office.

HERCULES POWDER COMPANY
INCORPORATED

934 King Street - Wilmington, Delaware

ALLENTOWN, PA. - - - BIRMINGHAM - - - BUFFALO - - - CHICAGO - - - DENVER - - - DULUTH - - - HAZLETON, PA.
HUNTINGTON, W. VA. - - - - - JOPLIN, MO. - - - - - LOS ANGELES - - - - - NEW YORK CITY - - - - - PITTSBURG, KAN.
PITTSBURGH, PA. - - - ST. LOUIS - - - SALT LAKE CITY - - - SAN FRANCISCO - - - WILKES-BARRE - - - WILMINGTON, DEL.

A-15

TEAM PLAY

and the

MANUFACTURER

The annual American Mining Congress Coal Convention and Exposition is one of the successful activities of the Manufacturers Division

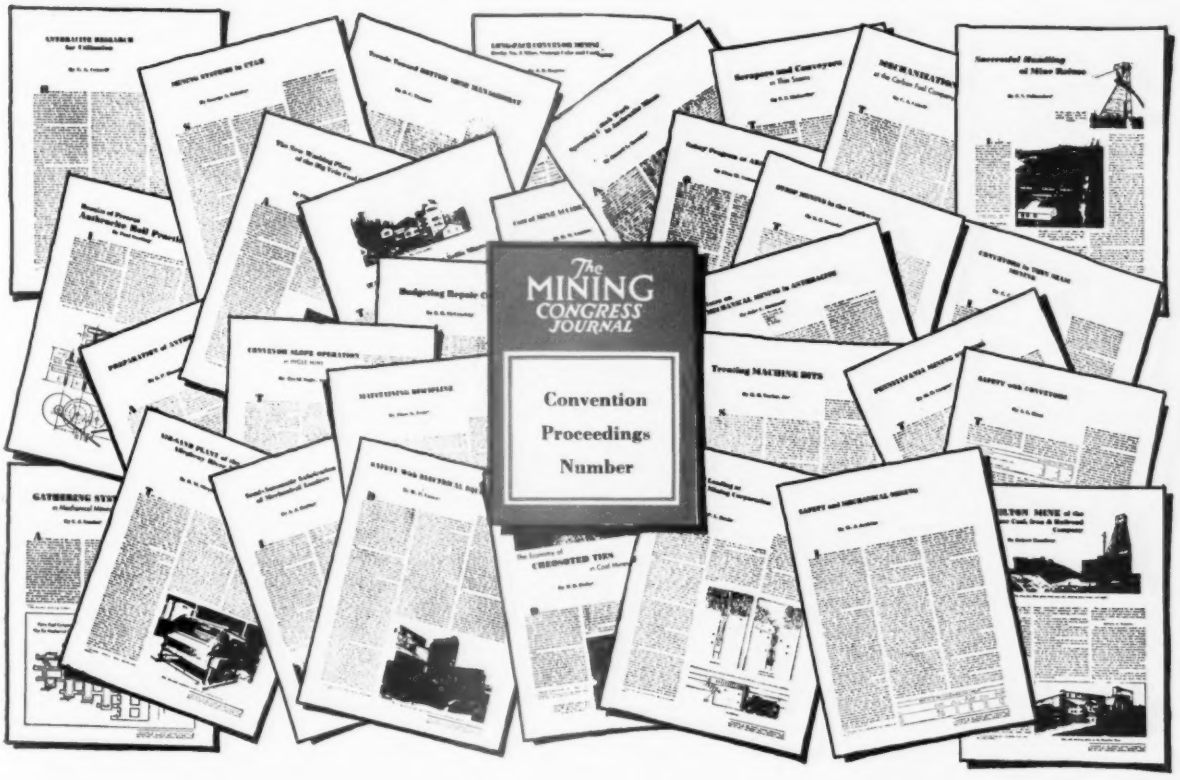
In baseball or business, football or finance, team play is very often the deciding success factor. ● The Manufacturers Division of the American Mining Congress offers to the manufacturer of mining equipment an opportunity for profitable team play unexcelled in any industry. ● Not only does the manufacturer-member benefit directly and continually through the contacts afforded with the mine operating executives, but he likewise becomes a participant in all of the many other activities of the American Mining Congress—legislative, economic and cooperative. ● The membership fee is moderate. ● The opportunities are unlimited.

THE MANUFACTURERS DIVISION

OF

THE AMERICAN MINING CONGRESS

WASHINGTON, D. C.



Here they are, Gentlemen!

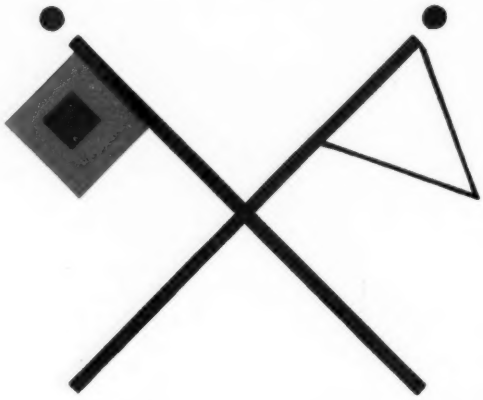
The entire group of 35 copyrighted Convention Papers exactly as presented at this year's American Mining Congress Coal Convention and Exposition at Cincinnati. Bound in a single volume . . . convenient, compact and complete . . . the CONVENTION PROCEEDINGS NUMBER of THE MINING CONGRESS JOURNAL. A comprehensive reference work on the most recent trends and successful developments of modern coal mining practice, with a special mechanization section presenting the latest equipment of many of the foremost manufacturers. This issue is absolutely free, upon request, but the edition is limited. Fill out the coupon below and mail it at once if you have not already reserved your copy.

The American Mining Congress,
841 Munsey Building,
Washington, D. C.

Please reserve for me a copy of the CONVENTION PROCEEDINGS NUMBER of The Mining Congress Journal.

Name Firm

Position Address



THE WEATHER FLAGS OF COMMERCE

Coal consumption increases in a certain middle western state. Coal deliveries become more active on a certain eastern railroad. Coal in storage starts to move in a certain southern industrial district. Signs! Signals! The weather-flags of commerce! Each one packed with vital information for the coal man who knows about them in time and who can correctly interpret their significance.

In the August number of the MINING CONGRESS JOURNAL Newell G. Alford, nationally known mining engineer and associate editor of the Journal, will present a graphic survey on coal trends over the past few months in several geographical areas, together with a commentary on the conditions reflected thereby.

Do not miss this great coal feature in the August Journal.

"CURRENT TRENDS IN BITUMINOUS COAL"

By NEWELL G. ALFORD

In this same midsummer issue will also be included a group of extremely interesting Metal articles, among them

HAULING MORENCI'S MUCK

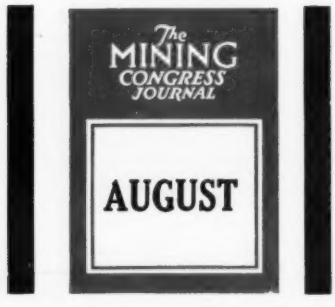
By M. C. PELLISH, Jeffrey Mfg. Co.

and

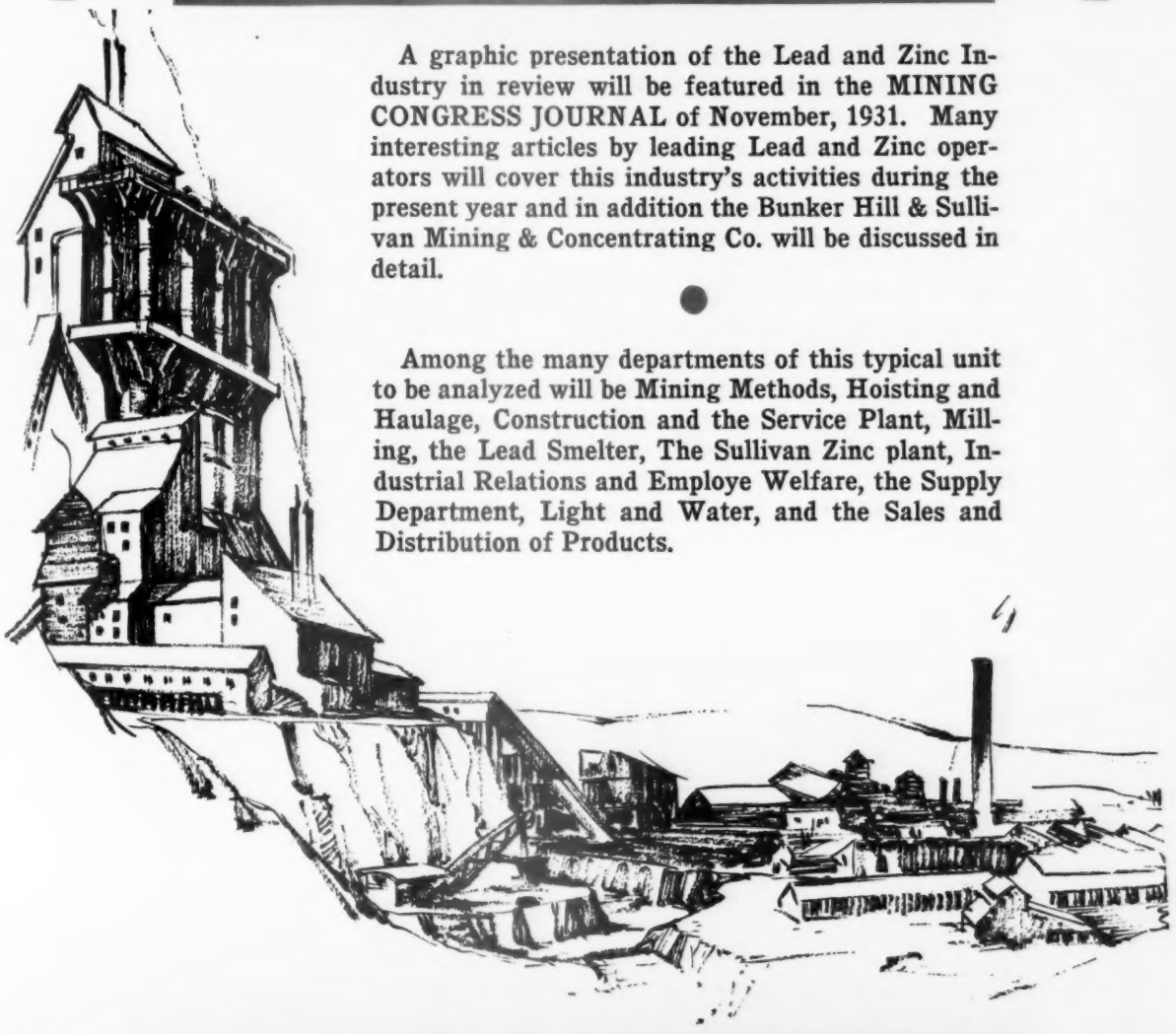
MILL AND SURFACE IMPROVEMENTS AT THE SPRING HILL MINE

By L. A. GRANT and A. L. PIERCE

Also the regular monthly Journal departmental features. . . . G. B. Southward's Mechanization Department, Practical Coal Operating Men's Department, Practical Metal Operating Men's Department, and News of the Field.



LEAD and ZINC

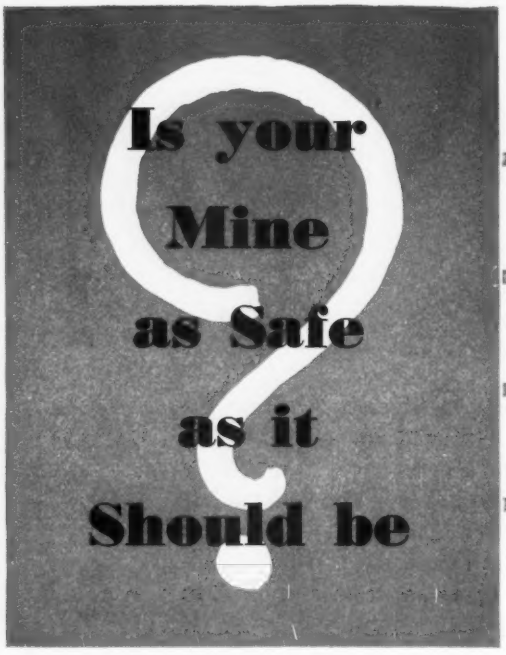


A graphic presentation of the Lead and Zinc Industry in review will be featured in the MINING CONGRESS JOURNAL of November, 1931. Many interesting articles by leading Lead and Zinc operators will cover this industry's activities during the present year and in addition the Bunker Hill & Sullivan Mining & Concentrating Co. will be discussed in detail.

●

Among the many departments of this typical unit to be analyzed will be Mining Methods, Hoisting and Haulage, Construction and the Service Plant, Milling, the Lead Smelter, The Sullivan Zinc plant, Industrial Relations and Employe Welfare, the Supply Department, Light and Water, and the Sales and Distribution of Products.

THE MINING CONGRESS JOURNAL *for* NOVEMBER



What safety restrictions should be placed upon the make up of man trips?

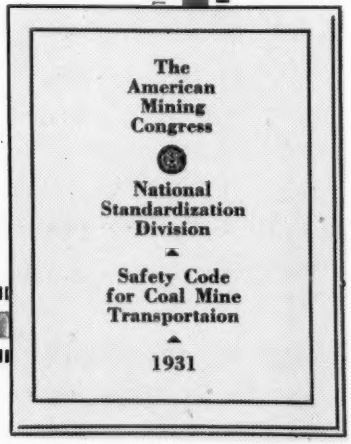
What are proper minimum safety clearances between locomotives and timber on slopes?

What is the minimum safety factor for new rope on a hoist?

Can you answer the above questions correctly? They, and dozens of other questions on safety in its direct relation to conditions in your own mine are fully considered and answered in the new "Safety Code for Coal Mine Transportation" now ready for distribution.

This manual of safe operating practice developed by the Coal Mine Branch of the American Mining Congress' National Standardization Division under the procedure of the American Standards Association, thoroughly covers both installation and operation and includes safety recommendations as to track, clearances, signals, doors, slope hoists, shaft hoists, cars, gathering practice, rope haulageways, locomotives, man trips, explosive hauling and inspection.

It is the one Standard that *every* coal man needs and should have. The price is 25 cents. Order your copy now!!



GOLD AND SILVER

"There is grave difference of opinion between those who believe the world's gold supply is sufficient for all purposes and those who believe that the credit money which world commerce has called into being has reached a danger-point. . . ."

—*The Mining Congress Journal*

"At no other time in history has the status of silver occupied so important a position in world-wide discussions as at the present time. . . ."

—*The Mining Congress Journal*

These two pre-eminent monetary metals will be featured in the December issue of THE MINING CONGRESS JOURNAL. Their past, their present, and their future will be thoroughly discussed, while a review of leading properties in each classification will afford a most interesting insight into their handling of practical operating problems.

■ **Also regular monthly JOURNAL features** ■

DECEMBER *The* MINING CONGRESS JOURNAL 1931

Why TIMKEN is the mining industry's most efficient anti-friction bearing

The modern designing engineer selects anti-friction bearings mainly on the basis of these three essentials—friction elimination, load carrying capacity, precision. Hence the mining industry's overwhelming preference for Timkens for its toughest jobs in mine cars, locomotives, loaders, mine motors, hoists, conveyors and all other equipment. It will pay you, over and over, to specify Timken Bearing Equipped.

FRICTION ELIMINATION

The Timken Tapered Roller Bearing is practically free from all friction, due to (a) tapered rolls operating between tapered raceways, a basic principle originated and developed by Timken; (b) precision machining of the tapered rolls and raceways; (c) positive alignment of rolls under all loads and at all speeds; (d) spacing of the rolls by a scientifically designed cage... Roll spacing is an important fundamental. There is a limit to the number of rolls that can be used in a bearing of any given size without incurring a severe friction penalty. Positive roll alignment through end contact of the rolls with the cone rib, is a basic feature of the Timken Bearing. The cage is only used to space the rolls.

LOAD CARRYING CAPACITY

The Timken Bearing carries all radial, thrust and combined loads equally well, due to Timken tapered construction. Size for size, Timkens can carry maximum loads because (a) the loads are carried on the entire length of the tapered rolls, cone and cup; (b) the largest possible number of rolls permissible with full anti-friction efficiency is used; (c) the material employed is Timken-made alloy steel developed and produced exclusively for the purpose. Timken Bearings are carrying loads up to 8 million pounds in steel mills.

ACCURACY and PRECISION

The Timken Bearing is manufactured to close limits of accuracy under the most thorough and rigid system of inspection and testing that could be devised. Much of the special machinery used was designed and developed by Timken engineers. Timken precision has revolutionized the performance of heavy duty machine tool spindles.

TIMKEN *Tapered Roller* **BEARINGS**

The
MINING CONGRESS JOURNAL

**A Monthly Magazine—The Spokesman For The Mining Industry—
Published By The American Mining Congress**

VOLUME 17 JULY, 1931 No. 7

Editorials

Against the Public Welfare

DURING the war the price of copper was fixed at 26½ cents per pound. Since that time the price of copper has dropped to below 9 cents per pound, which is now the market price. If there is any relation between the government-fixed price upon the one hand and the present ruinous price upon the other, we should undertake to understand that relation.

The high war price stimulated enormous production. It led to the investment of millions in plant betterment. When the war was over, the result of this government-fixed high price level was an enormous stock of copper which the markets of the world must sooner or later absorb. The effort to digest this overproduction was joined in by both the government and the copper producers and at the same time the men employed in copper mining were continued on the pay roll of the copper mining companies at great loss as a part of the great readjustment program to be carried on without throwing men out of employment or decreasing the wages paid. We have no desire to criticize the efforts made during the war to stimulate overproduction because at that time no estimate could be made of the amount of copper which might be necessary in carrying on the war. However, the results form an illustration of the dangers of government control or interference in business affairs. Whenever an artificial condition is created in any industry, that industry is sure to suffer.

During recent years there has been a strong tendency on the part of people all over the country to believe that whenever a difficult problem presents itself an appeal should be made to the government for assistance, and many and ingenious are the reasons developed for asking government aid.

We are drifting rapidly away from the fundamental principles and now we are clamoring for unemployment insurance, for Federal loans to farmers in distress, for Federal loans to service men, for Federal aid for road construction, and each of our states in turn is matching this money with equal number of dollars which in the end is a burden which falls most heavily upon local real property.

Our prosperity is based on conditions where each individual is required to work out his own problem, asking only that the government shall not interfere. The government which provides conditions under which business may succeed and which protects the life and property of its citizens has completed its work and every activity beyond those requirements is bound to react against the public welfare.

Gold, Money and Credit

THE difference between the barter transactions of ancient days and the business transactions of the present day are about in proportion to our little earth and the great universe which surrounds it. In the early days the subject of barter was immediately delivered and there was no need for credit. Credit in the modern business world is based upon security and integrity. Credit money is based upon the integrity of the issuing agency and supposedly always backed by a metallic basis or some other form of property readily exchangeable for gold.

The issuance of money is strictly a governmental function and in sound financial countries is always so limited that its redemption in coin is supposedly and at all times an immediate possibility. Fundamentally then, in gold standard countries gold is the only real money. Unless the amount of gold shall increase in proportion to the stock of wealth, the value of which it must measure, the necessary result is a decrease in price levels.

The increase of the monetary gold of the world, even if the whole production were absorbed in its monetary reserves, would not in any one year make any marked change in the situation. The total monetary stock of gold in the world is approximately $10,000,000,000 while the annual world gold production is approximately $400,000,000 or 4 percent.

The fact is that a large part of our annual production is used up in the arts and for manufacturing purposes, so that a total addition which can be made to the gold supply of the world is approximately 2 percent annually.

During several years past India alone has absorbed more than 20 percent of the world's gold production, leaving but little more than 1 percent to be added yearly to the monetary stock of gold of the world. India's absorption, very unfortunately for India and the balance of the world, does not become a basis of credit but passes out of use and into hoarding and is of no value either to India or to the world.

Money based upon gold credit is therefore so limited in its expansion as not to keep pace with the growing values which it measures. It has been well said that all business depression results from a misuse of credit.

The relation between world-wide business depression and world gold supply is not as remote as many believe who fix the responsibility upon Wall Street speculation, upon overproduction and under-consumption or who assign the blame to those fundamental business principles upon which the great industrial prosperity of the past has been based.

An American Plan

WE SELECT the title of this editorial advisedly. We cannot imagine this country apeing Russia with her "five-year plan," but newspapers generally have greedily gathered the phrasing to their bosoms and have announced Mr. Hoover's address to the Indiana Republican Editorial Association as "An American Plan" for the next twenty years.

We prefer "An American Creed," for that is what Mr. Hoover was advancing; a creed to which every loyal American can and does subscribe. And in pith the creed is that laid down centuries ago, of "Do unto others as ye wish to be done by." Mr. Hoover stated pointedly enough that with marvelous success the American people have been working according to rules they, themselves, evolved, tried, found adequate, and that we would continue along the same line with equal success. He held up the spectre of Russia and her sodden masses, and their Five-Year Plan, and let the light of day penetrate. He said, "Any system must be the outgrowth of the character of our race, a natural outgrowth of our traditions; we have established certain ideals, over 150 years, upon which we must build, rather than destroy." His statement on the tariff and other factors of public interest definitely proclaim his leadership, as does his reference to that time-honored, pilloried government and business discussion, which was "Shall the government, except in national emergencies, enter upon business processes in competition with its citizens?" His answer to that question was made before he uttered it in his veto on Muscle Shoals.

The "American Plan," or the American Creed, embraces a policy which includes live and let live, honor, justice, liberty, cooperation and vision.

Coal Freight Rates

TRANSPORTATION lies at the basis of all prosperity. Nothing has any value until it is moved from the point of its origin. The railroads of the United States have furnished an increasingly effective transportation service, both passenger and freight. The competition of other forms of transportation, during recent years has cut very materially into the income earned by railroads and the present situation creates a question as to whether the railroads will be able in the future to maintain an earning power which will make possible the maintenance of the excellent service of the past. It is said that railroads of the country during the year 1930 earned but 3½ percent on their property investment. This earning was barely sufficient to meet their fixed charges. For the first quarter of 1931 these earnings have been reduced to about two percent, which is said to be less than their necessary fixed charges.

Not many years ago the railroads were the target for much criticism; their charges were alleged to be exhorbitant; their service unsatisfactory, and their part in community progress very greatly underestimated. Conditions have radically changed because of the newer competition of bus and airplane service. The present depressed business conditions have so greatly reduced their earning power as to make the possibility of their continued effective service a matter of grave public importance.

Railroad managers will need to find some other remedy for their present difficulties than by the increase of freight rates which will drive more and still more of their business into the hands of their new and increasing competitors. It is difficult to understand the proposal of some railroad managers for an increase in freight rates when the business which is now being taken from them by competitors will be increased in proportion to the increased charges made for transportation. This applies with particular force to the coal industry which supplies a very large part of the freight earnings of the United States which is having its markets greatly curtailed by the use of gas and oil, largely transported through pipe lines and to that extent furnish no income to the railroads. It would seem to be the better plan to aid in the creation of such competitive conditions as will enable coal to win back the markets which it has lost and is losing to oil and gas rather than to put additional burdens upon coal and thus aid the further absorption of fuel markets by those commodities which furnish no income to the railroads. Railroad earnings will not be increased by adding to the burdens of an already overburdened industry.

Safe Transportation

FOR THE past 10 years a national committee, representing the various coal producing fields, has been working continuously to develop a set of guides that would be of real assistance in practical, safe and efficient production methods. The procedure has necessarily been slow because of the breadth of the field and the many factors involved. While personal experience and opinion are valuable, any recommendation for promulgation as a standard must coordinate the best thought, and whip it into phraseology acceptable to a large group.

Therefore more than average interest attends the announcement of the American Mining Congress, that its Standardization Division, through the Coal Mining Branch, has ready for distribution a "Safety Code for Coal Mine Transportation." This code, which has the endorsement of the American Standards Association, and other cooperating organizations, will become a part of the recommendations which have gone to develop Standard American Coal Mining Practice.

Other codes have from time to time been presented, including the recent "Safety Rules for Installing and Using Electrical Equipment in Coal Mines" "Rock Dusting" and similar efforts, sponsored by this organization.

The code in question will go far to help in solving safety problems, and transportation is one of the major contributors to accidents. The committee, the American Mining Congress, and the American Standards Association are to be congratulated upon this their latest achievement. Coal mining officials alert to the possibility of saving, through a reduction of the accidents incurred in transportation, as well as in the general

safety movement, will be quick to put this code into effect at their mines. The scope of the code is defined as follows: "Safety requirements for the installation and operation of transportation equipment in and about coal mines. Its purpose is to suggest and recommend safe methods of transportation for the coal mines of the United States."

A Fertile Field

WORKERS in industry generally are gradually learning that all of their woes are not attributable strictly to the sins of commission and omission of their immediate employers. There is some reason to believe that there is a better understanding of the multitude of things that go into the success or failure of an enterprise. We say this, in spite of the fact that in the coal industry a strike of proportions is being conducted.

The last 10 years has witnessed a period in which thousands of coal mines have been abandoned and in which hundreds of coal companies have passed out of the picture. The workmen remaining in the industry and the many who have been and are suffering from the unfortunate situation of coal have, in the main, come to a feeling that there is something materially wrong in addition to what they once believed was the cause of all their ills. Gradually as mine after mine has been abandoned, as community after community has passed into the limbo of forgotten things, there has developed a feeling that the entire social structure is at fault, if not entirely wrong. This feeling is a serious thing. It extends to criticism of government, of our constitutions and our methods, which rest on the foundation of our Constitution.

With this feeling existing in a wide degree among coal mine workers, it offers a fertile field for the spread of doctrines that strike at the very foundation of our national life. At the present time, Pennsylvania, Ohio and West Virginia coal fields are the mecca for the disgruntled and also the battle field of two organized forces, each seeking domination. The United Mine Workers of America and the National Miners Union. With the first we are all familiar. We have disagreed with their policies. We have criticised their methods, but never at any time have we denied the right of organization. But the U. M. W. of A. is pure, lily white compared with the National Miners Union, which is frankly a handmaiden of the Communist Party, advocating the overthrow of our government and the substitution of the Russian system. This organization is not confining its activities to the local coal fields but is waging its battle far afield. Handbills have been freely distributed in New York City, on the subways, in the elevated trains, in the street cars, carrying the headlines "Murders in the coal fields" and calling upon all interested communists to join hands against the coal operators who, with the aid of the governor of the state, are attempting to force slavery through starvation.

With the conglomerate mass of humanity that man the coal mines, speaking many different languages and dialects, it is impossible to reach in any understandable manner any considerable group of them.

The coal industry is faced with enemies from within and without; faced with severe competition; faced with a political situation well nigh unbearable; faced with drastic competition from rival fields; with high freight rates; with the necessity of ever increasingly cheaper fuel; with a multitude of things that makes most coal men regret that they are coal men. Yet with it all, the industry continues to be the backbone of industrial America, to furnish amazingly cheap power, to give employment to thousands and thousands of workers, to pay vast sums into the coffers of the government in taxes, to contribute to the growth of this country in a way no other industry can contribute.

The coal industry needs intelligent help. It needs understanding and the upholding of its arm in its time of distress. But above all, the coal men themselves need to seriously join cooperative organizations and inaugurate a campaign of understandable facts to those outside the industry.

To Arms!

IF THE governors' conference at French Lick did nothing else, it brought into bold relief certain men and their political policies, holding up to the country a reflection of the type of leadership we may expect from governors of various states. With all due respect to the governors and to the aspirations of some of them to the White House, little credence was given to the loudest shouter, Mr. Gifford Pinchot, erstwhile follower of Theodore Roosevelt, and a rabid conservationist, in his indictment of the power "trust."

According to the picture painted by Mr. Pinchot, 120,000,000 people are in imminent danger of losing their hard earned freedom to a greedy group, standing like some gargantuan monster, catching and destroying them as they come unwittingly around the corner. This giant destroys not only the people themselves, but the governments of the localities in which they hide. Apparently, Pennsylvania and its governor are impotent against so great an enemy! Thus the call: "to arms! to arms!"

But is the public so completely at the mercy of this arch enemy? Supreme Court decisions do not bear the governor out. The right to regulate local rates is a right still belonging to the states and municipalities. With that right, upheld by Supreme Court decision, it would scarcely seem that there is anything but aspiration to the White House to be found in the froth and foam which flowed so freely.

And what of this Giant Monster? It has brought to us as a people the greatest blessings of all time. It has lessened the labor of the housewife and the burden upon the head of the household. It has brought untold joy to the invalid. It has turned the farm into the convenience of the modern city. It has brought to the uninformed and uneducated, education and culture. It has been a solace to mankind such as was little dreamed of by our ancestors. And because of these things, it has become great. Its hand is felt in every hamlet and community. It is the magic of civilization.

A literal adoption of Mr. Pinchot's principles would mean that the civilization which we now enjoy would lie in rot at our feet; that the great business structure of our country would be under the dominance of the politician, who so frequently strives first to aid himself, and his country after; and with a conservation bug run amuck, removing our resources from the normal trend of development, our supremacy in world affairs would change from leadership to followership.

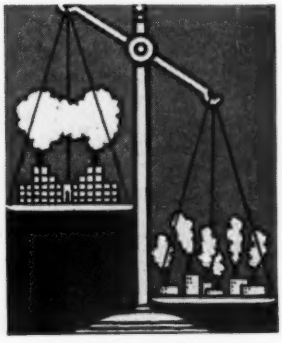
BRAINS *as a* natural resource

By Dudley V. Haddock
Manager of the Arkansas State Chamber of Commerce

ONE sometimes wonders if the South isn't forgetting how to make the best use of its brains, the most valuable of all the natural resources the Lord has seen fit to bestow upon it. That we possess our share of the nation's genius has been proved over and over again in society, business, industry and statesmanship but there is ample evidence that we are not now taking full advantage of it. We are forging ahead, it is true, but we are creating wealth in other sections of the country that should be created at home because we send to them the cream of our possessions and reserve to ourselves only the skimmed milk. There are cities in the North and East grown rich upon Arkansas and Louisiana hardwoods, upon Texas leather, wool and mohair, upon Florida phosphate, Mississippi cotton and scores upon scores of products peculiar to their sister states.

Seemingly, we are satisfied with the dollars received in exchange for our raw material, not realizing that we turn around and immediately send them back from whence they come. In the last analysis the country, when it purchases Southern raw material, simply places in our hands a few dollars to be held in trust for only so long as is required to fabricate it into something that can be sold to us over the counter. We never have awakened to the realization that in the end it has both its money and our material and that the latter, to all intents and purposes, has cost it nothing. This appears to be a far fetched assertion but it is not so unsound after all when one analyzes it.

Arkansas produces novaculite, sells it for $75 or $80 a ton and it is moved to Pike, N. H., near the Canadian border, and cut up with gang saws. Then small slabs or slivers of it are sent right back to Arkansas and other Southern states in the form of razor hones and oilstones to be sold to us on the basis of anywhere from $10,000 to $15,000 a ton. Texas produces more leather than any other state in the union but it sends something like $60,000,000 annually to Brocton, Mass., and St. Louis, for shoes. It is not difficult to realize that Texas' net profit from its vast leather industry would hardly purchase a pair of leggins for a canary.



We should encourage establishment of small industries .... There are not one thousand industrial units in the country employing a thousand workers

Brains are not lacking in the South but the difficulty seemingly lies in our failure to make proper use of them. Time and again we have been accused of laziness but knowing the capacity of the Southerner to do things one is inclined to believe the trouble lies largely in a lack of information rather than inertia. Knowledge is power and once we ascertain what we have and what the other fellow is doing with our possessions while we stand by and twirl our thumbs we will begin to exploit the greatest resource the Lord has given us, our brains.

Does it mean anything to the thinker when he learns that American capital to the extent of $1,043,442,000, of which $443,812,000 was for the establishment or expansion of industrial enterprises, was invested outside of the United States during 1930, not in American but in foreign owned activities? How many of us are aware that approximately 500,000 foreign workers were employed in American owned industrial plants abroad last year while millions of our people at home peddled apples on street corners or stood in bread lines?

One may venture the assertion that the major portion of this more than one billion dollars could have found profitable investment in the South without hardly scratching the surface of its opportunities. An investment in our own country is surrounded with far more safeguards than one in Europe, Asia, Africa, or South America, and certainly there is more assurance of a profitable return even though we do have to contend with a demagogic Congress and a half hundred asinine state legislatures. The worst of our legislatures, no matter how far it might go to single out and penalize the business man whose genius and enterprise have earned a profit, could hardly be more uncertain than the politically inspired, constantly changing economic conditions in a foreign country where government is as unstable as the fashion in women's hats.

It is of the utmost significance that during the 10 years between 1920 and 1930 the South experienced a gain of

Presented to Annual Meeting of the Southern Division of The American Mining Congress, Louisville, Ky., March 17, 1931.

4,897,000 in population, an increase of more than 800,000 in excess of that of any other geographical division of the country. Our population in 1920 was 36,307,000; in 1930 it had increased to 41,204,000. It is equally significant that the wealth of the South today is greater than that of any other geographical division of the nation except the Middle Atlantic states, including New York, New Jersey and Pennsylvania.

It proves that the South, in addition to its already tremendous purchasing power, is the most rapidly growing market in the country. It should lend encouragement to the establishment of industrial and business enterprises from Texas to Maryland and from Florida to Missouri because here is an assured outlet for manufactured commodities and certainly there is no question about our possession of basic raw materials, labor, fuel, power, transportation facilities and the brains and capital to make use of them.

There is every reason to expect in the South during the next few years the beginning of an era of industrial development such as the nation has never before witnessed. During the summer of 1925 one could buy land in Florida sight unseen with assurance of a profit before nightfall. Those of us who were in Florida during the boom and who witnessed its collapse were confident nothing like it ever would occur again in this country but a better and more sound opportunity for investment is available today not only in Florida but in every other Southern state. Capital can be invested almost blindly in industry and business anywhere in the South at this moment with far more assurance of a profitable return than Florida real estate offered during the most rosy days of the boom. The constant growth of the region and its great wealth are the guarantees.

After years of observation and study of the economic development of the Southern states one point becomes more clear as time passes. The major portion of the energy and money expended in efforts to bring in or create the great industry is wasted. We ignore the little fellow, losing sight of the iron clad law of nature and of economic endeavor that everything must have a small beginning. The oak grows from an acorn and even the devastating hurricane develops from a miniature whirlwind at sea that would hardly fill the sails of a yacht. It requires little research to determine that every large industry in the nation began on a small scale, unless it was established as a branch of a great enterprise active in another locality. There are not

There are cities in the North and East grown rich upon scores of products peculiar to their sister states of the South

■

in the country today one thousand industrial units employing as many as one thousand workers, including the president and the office boy. The average industry in the United States has only 44 workers on its pay roll and that day when the South becomes aware of it can be recorded as a milestone in its industrial progress. We should encourage the establishment of the small industry and, further, we should launch it with our own money for investigation has determined that approximately 80 percent of the industrial enterprises established in this country are financed locally.

No longer must a community be a large city in order to attract or justify the establishment of industry. The small town is coming into its own because overhead in such a locality is considerably less than in or near a great city. The small industry applies this saving to development and expansion and the large enterprise is enabled to reduce the cost of production and be in better position to meet competition.

A billion dollars of American capital was invested outside of the United States in 1930 —four hundred million of this for establishment or expansion of industrial enterprises

■

It was the privilege of the speaker several years ago to collaborate in the preparation of an exhaustive work dealing with one of the Southern states. The volume, one of several hundred pages and bound in the customary, high grade cloth cover, was not manufactured in New York, Philadelphia, Boston, or Chicago. It was the product of the world's largest publishing plant, in the little town of Kingsport, in the mountains of eastern Tennessee, printed on paper manufactured in Kingsport, with type set in Kingsport, with ink made in Kingsport and bound with material produced in the same community. Virtually every circus and carnival admission ticket sold in the United States and millions upon millions of the baseball, football, theater and other tickets sold from Capetown, South Africa, Manila, and Honolulu, to Mexico City, Havana and Halifax, are manufactured in the largest ticket printing plant but one in the world, not in London, New York, or Chicago, but in Fort Smith, Ark.

The largest bottle washing machinery plant in the world isn't in one of our great cities but in the little town of Bainbridge, Ga. Although rice is the principal diet for more than one third of the earth's population and comparatively little of it is consumed in America, Lake Charles, La., possesses the world's largest complete rice mill. The little city of Anniston, Ala., with some assistance from Birmingham, produces nearly one-half of the country's output of cast-iron pipe. McComb, Miss., operates the largest single unit ice plant in the world and the plant in Columbus, Ga., which manufactured the world's first commercial ice machine is still producing that equipment. One of the largest clay tile and clay products plants in the country is operating in Texarkana, Tex. Why, Kentucky alone possesses 25 of the largest single industries of their kind in the world and by no means are all of them located in Louisville, the state's greatest city.

The output of Southern manufacturing plants already has an annual value of $10,375,000,000 and analysis of the statistics would disclose that a huge proportion of this vast sum is accounted for by the community of less than 15,000 in population.

The future industrial development of the South is merely a matter of ascertaining our needs as consumers, the extent of our resources and, having accomplished this task, the putting of our greatest natural resource—our brains—to work.

V17 7 JUL 31 XUM

Modern Face Preparatory Operations

Showing comparisons between the labor used at twenty-five typical mines in the United States. These figures are divided between the different operating phases of cutting, drilling, and shooting. The reports show a general cross section of present operating results.

By G. B. Southward

THE face preparatory operations considered in this article include the work done in breaking down the coal from the solid into a form suitable for loading. This includes cutting, shearing, drilling, and shooting. All of these have been done with machinery for some years past and their mechanization is not new, but with hand loading the contract miner usually did his own drilling and shooting, so that the amount of actual work involved by these operations was not accurately known. The cutting was generally performed on a separate contract and its cost could be determined. With mechanical loading it is usual to employ a separate crew for each of the face preparatory phases, and it is becoming customary with hand loading to take the drilling and shooting from the regular duties of the miner and do this work with company men. As a consequence in the more modern developments the cost of the face preparatory work can be accurately divided so that efficiencies under different methods can be compared.

In order to show what results are being had there is submitted with this article figures covering 25 mines operating under typical conditions in all of the principal coal fields of the United States. These include seam heights ranging from thin to thick coals. There is hardly a sufficient number to say that these will give a true average of all the mines in the country, but it is believed that they will serve as a general cross-section of modern practices.

These mines include cutting with short-wall, longwall and track mounted machines and drills of different size and types. Because of the small number of mine records submitted it would not be fair at this time to differentiate between the different types of machines used. Neither does this article show the mining systems employed, although the list includes room work, pillar recovery and long face mining. These factors all have a distinct bearing on the labor employed in each of the operating phases, and it is expected to make comparisons of this nature in a later report when more data is available. The present purpose is principally to show that there is considerable divergence between the results at different mines.

To some degree the method of loading affects the amount of face preparatory work done. With mechanical loaders of the mobile type it is necessary to have a more complete breakdown than is required by hand loading either onto conveyors or into mine cars. There may be some hand work required to break up large lumps and to pick down hanging coal where a mechanical loader is used. There may also be labor used for coal cleaning where the impurities are of such a nature that they can be hand picked at the face before or during the loading. For an extremely accurate comparison it might be necessary to take into account the type of loading equipment used, but since the factors just mentioned do not greatly affect the capacities of the machines for drilling and cutting, they are not considered in the discussion of this article.

TABLE NO. 1
MAN HOURS EMPLOYED PER TON FOR FACE PREPARATORY WORK

Mine No.	Hgt. Coal	Man Hours Employed per Ton for Face Preparation: Cutting	Shearing	Drilling	Shooting	Total	Order of Listing in Table 2
1	11′	.032	..	.032	.004	.068	O
2	8′ 6″	.045*	..	*	.023	.068	H
3	8′	.080*	*	*	..	.080	L
4	6′ 8″	.053	..	.027	.003	.083	G
5	4′ 6″	.085	..	..	..	.085	B
6	6′	.068*	..	*	.023	.091	F
7	7′ 6″	.046	..	.023	.023	.092	M
8	6′ 4″	.041	.011	.027	.013	.092	I
9	6′ 2″	.064	..	.032*	*	.096	J
10	8′ 6″	.064*	*	*	.032	.096	Q
11	4′ 8″	.094*	..	*	.004	.098	C
12	6′	.047	..	.047	.011	.105	K
13	5′	.071	..	*	.036	.107	E
14	7′	.051	..	.051	.007	.109	P
15	3′ 4″	.058	..	.044	.014	.116	A
16	8′ 2″	.048	..	.048	.025*	.120	U
17	8′	.044	..	.045	.033	.122	V
18	7′ 7″	.082	..	.035	.007	.124	S
19	5′ 6″	.059	..	.059	.015	.134	N
20	7′	.061	..	.061	.016	.138	T
21	3′ 4″	.089	..	.027	.027	.143	D
22	6′ 6″	.058	.028	.057*	*	.143	R
23	8′ 4″	.060	..	.060	.030	.150	Y
24	7′	.080	..	.080	..	.176	W
25	6′ 10½″	.103	..	.077	..	.180	X

* Indicates where two or more operations are performed by the same crew of men, but their time is not kept separately. For example, Mine No. 2 uses .045 man hours per ton for both the cutting and the drilling.
.. Indicates operations not done or not reported.

It is, of course, impossible to make any direct comparison between mines which will accurately measure their performance efficiencies. There may be bad top which will delay the cutting while posts are being set. The hardness of the coal will vary so that the machine cutting rates will not be the same or there may be hard streaks of impurities in the cutting section of the seam which will necessitate frequent bit changes. In the comparisons submitted with this article therefore it must be understood that these unknown factors are not taken into account.

It is possible, however, by comparing the performance records of these mines to get a general idea of what should be possible or what can be expected and from this an operator can estimate whether his own performance is what it should be taking into account his mining conditions.

In *Table 1* there is a comparison between 25 mines representing operations from all of the principal coal fields and including seam heights of thin, medium and thick coals. This table is reduced to the number of man hours employed per ton for each of the face operations and on this basis the comparison is as direct as though the figures were given in dollars and cents per ton. The mines in this table are listed in the order of their efficiency. That is to say that the total man hours employed (equivalent to cost) increases down the list. For instance, Mine No. 1 has a cost of .068 man hours per ton for all of the face preparatory operations, while mine No. 25 has a similar cost of .180 man hours per ton—nearly three times as great. In this table the average total is 1.12 man hours per ton produced.

It will be noted that mine No. 1 also uses the least amount of labor for the cutting, but other mines have lower man hours per ton for the drilling and shooting. If we were to take the lowest record made in each phase the total would amount to .058 man hours per ton, which is a combination of mines No. 1, 7 and 4. This seems to indicate a theoretical low man hour limit for these mines reported, but such a conclusion would not be correct, as will be shown in the following paragraphs.

The greatest determining factor in the amount of coal produced for the labor employed in the face preparatory methods is the height of the seam. It is obvious that the same degree of efficiency and the same number of men employed will produce twice as much coal in a 6 ft. as in a 3 ft. seam. To some degree this is true of the drilling and shooting, although an extremely thick seam will require two rows of drill holes. Also, partings may require the coal to be shot in two benches. However, a comparison based on the number of square feet of kerf cut during a shift will be much better than a man hour basis to show the true comparison between different mines. This is done in *Table 2*.

TABLE NO. 2—MAN HOURS EMPLOYED PER 100 SQUARE FOOT OF KERF FOR FACE PREPARATORY WORK

Mine No.	Hgt. Coal	Man Hours Employed per 100 Square Foot Kerf: Cutting	Shearing	Drilling	Shooting	Total	Order of Listing in Table 1
A	3′ 4″	.77	..	.58	.18	1.53	15
B	4′ 6″	1.53	..	..	..	1.53	5
C	4′ 8″	1.76*	..	*	.08	1.84	11
D	1′ 4″	1.18	..	.36	.35	1.89	21
E	5′	1.42*	..	*	.72	2.14	13
F	6′	1.63*	..	*	.55	2.18	6
G	6′ 8″	1.42	..	.72	.08	2.22	4
H	8′ 6″	1.53*	..	*	.78	2.31	2
I	6′ 4″	1.03	.28	.68	.33	2.32	8
J	6′ 2″	1.58	..	.80*	*	2.38	9
K	6′	1.13	..	1.13	.26	2.52	12
L	8′	2.56*	*	*	..	2.56	3
M	7′ 6″	1.38	..	.69	.69	2.76	7
N	5′ 6″	1.31	..	1.31	.32	2.94	19
O	11′	1.41	..	1.41	.176	2.99	1
P	7′	1.43	..	1.43	.21	3.05	14
Q	8′ 6″	2.18*	*	*	.08	3.26	10
R	6′ 6″	1.49	.74	1.48*	*	3.71	22
S	7′ 7″	2.49	..	1.07	.20	3.76	18
T	7′	1.71	..	1.71	.44	3.86	20
U	8′ 2″	1.55	..	1.55	.79	3.89	16
V	8′	1.52	..	1.52	.86	3.90	17
W	7′	2.47	..	2.46	..	4.93	24
X	6′ 10½″	2.84	..	2.13	..	4.97	25
Y	8′ 4″	1.99	..	1.99	1.00	4.98	23

* Indicates where two or more operations are performed by the same crew of men, but their time is not kept separately. For example, Mine No. C uses .176 man hours for both the cutting and the drilling.
.. Indicates operations not done or not reported.

Mechanization Survey of the American Mining Congress

Table 2 tabulates the same mines as in *Table 1*, but with their results shown in the form of the man hours required to prepare 100 sq. ft. of kerf. This table divides the total face work into the different operating phases as was done in *Table 1* and the mines are listed in the order of their efficiencies as calculated on this basis. For example, Mine A requires only 1.53 man hours for the same square feet of kerf that require 4.98 man hours in Mine Y. The average of the totals of this table is 2.98 man hours per 100 sq. ft. of kerf for all of the operations of cutting, drilling and shooting.

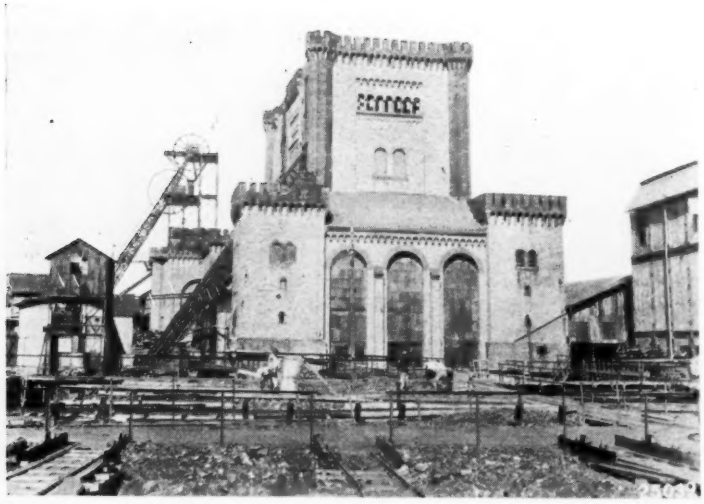
This table brings out one special item of interest. The order or rank of efficiency on this basis is entirely different from that in the first table. The last column shows the order which was followed in the first table. It will be noted that mine No. 1, which had the best man hour per ton record in *Table 1*, is now listed as Mine O in *Table 2*—the fifteenth in the list. Similarly, Mine A was fifteenth in the list of *Table 1*, ranked according to the man hour per ton production. This direct change of places is merely a coincidence and does not apply to the other mines.

Table 2 unquestionably shows the real basis of efficiency. By combining the lowest record made in each operation the man hour cost for cutting is .77, for drilling is .36, and for shooting is .08. This would make a theoretical low total of 1.21 man hours per 100 feet of kerf, which is considerably less than the best as reported by Mine A.

The best theoretical comparison for considering possibilities is by combining *Tables 1* and *2*. For example, if Mine A had a coal 6½ ft. high its tonnage would be doubled and its man hour per ton record of .116 given in *Table 1* would be reduced to .058 man hours per ton. Similarly, Mine No. 1 in *Table 1* requires 2.99 man hours per 100 sq. ft. of kerf as shown in *Table 2*. If this mine performed similarly to Mine A in *Table 2* its production per man would be double and it would produce at the rate of .035 man hours per ton.

It is not the intention of this article to say that the best record shown at each mine can be duplicated by all of the others, but it is the intention to stress the importance of accurate time studies and analyses so that the experiences and best practices can be interchanged between mines and companies.

(NOTE: *It is planned to publish subsequent articles similar to this but dealing with other phases of mining such as loading, gathering, haulage, timbering, etc.*)



Saar Government Collieries, Dudweiler Colliery, France

Progress of Coal Mine Mechanization *in* Foreign Countries

By W. H. Rastall*

U. S. Bureau of Mines Photographs.

Editorial Note—The accompanying article by Mr. Rastall is condensed from a very comprehensive and complete survey which he has made. Through lack of space it has been necessary to eliminate many interesting details of various operating methods employed.

IN THE United States the words "Mechanized Mining" have come to mean the use of machinery for all operations underground including the loading. In foreign countries, however, we find the greatest variety of circumstances. Some mines are still operated in the most primitive way, and in such countries mechanized mining may be used to mean merely mechanical coal cutting. In other countries they are beginning to employ conveyors to carry the coal certain distances underground even though these conveyors do not reach the face. As yet, in foreign countries, very little has been done in the direction of employing machinery for underground loading, although the development of mechanized mining will undoubtedly come to include this in the course of time.

In order to furnish the American Mining Congress with a statement describing the present situation with regard to the employment of machinery of various types in the coal fields of the world, an inquiry has been made during recent months in the various coal fields, and the following is based upon reports received mostly from the representatives abroad of the Bureau of Foreign and Domestic Commerce, although in some instances Consuls have cooperated.

GREAT BRITAIN

Coal Cutting

AMONG the various districts it is found that 63 percent of the Scottish output was machine cut, while in two districts, namely, Lanark and Fife, the percentage is as high as 69 percent, and 71 percent, respectively; in Northumberland 55 percent, South Derbyshire 50 percent; other areas generally comparing less favorably.

According to the latest report of the chief inspector of mines, there were 1,383 light pneumatic (mechanical) picks in use in 1929 at 94 mines for the purpose of coal-getting. The corresponding number in 1928 was 934. The quantity of coal dealt with by these picks increased from one million to two and one-third million tons. The use of these picks for coal-getting is, however, extremely localized, and 82 percent of the

* Chief, Industrial Machinery Division, Bureau Foreign and Domestic Commerce, U. S. Department of Commerce.

coal got by them was obtained at 15 mines.

A complete review of the number and description of coal cutting machines in use during each of the past 10 years is furnished in *Table 1*.

Conveyors

It is understood that prior to 1902 practically all of the coal was handled underground in small trams working from the face to the surface. In the majority of cases these were hand-drawn and proved a tedious and costly method, particularly when the gradients were heavy. Often times this work was dangerous. Conveyors were first introduced in 1902, but appeared to have been somewhat amateurish in their design, and for the most part they were designed and erected by local managers and operating engineers. Because of the resulting imperfections the development of this method of transport has been somewhat slow and it was not until after the war that the possibilities of this type of equipment received general recognition.

There are on the market conveyors and loaders of various types, catering for diverse classes of seams, and designed to apply to numerous and different natural difficulties. There are trough, face and flat belt conveyors, with drives at the end, the sides or below, as required. Thus, although this machinery is not designed specifically for any particular mine, it is of such flexibility as to permit of adjustment to meet all possible circumstances. Incidentally, as the present needs of the industry make it necessary for conveyors to be easily dismantled, re-assembled, or extended, the more modern types tend to become semi-rigid and portable, requiring comparatively little precision of alignment, and further, need to be capable of ready extension; one such conveyor, of a trough type, is said to be serving a road 700 yards in length.

The number of mechanical conveyors in use below ground increased from 2,856 in 1928 to 3,573 in 1929. These are used principally for conveying coal along the working face, also from this face to the main roads below ground. Over 37,000,000 tons of coal, some 14 percent of the total mined, was transported in this way in 1929.

Table 2 furnishes information regarding conveyors and loaders as employed not only on coal, but all minerals in the mines of Great Britain.

Scrapers

Scraper loading was introduced into Great Britain about two years ago. It is being used in seams varying in thickness from 5 ft. down to 1 ft. 3 ins., although up to the present only in long wall workings, and only where the roof is not very bad and the floor not very soft. However, a form of artificial floor is being considered which may overcome the soft floor difficulty and so extend the application of scraper loading.

It is understood that the best results are obtained where the coal is cut and blown. Under these conditions the increase in output per filler per shift is from 40 percent to 100 percent as compared with the output obtained from fillers delivering on to ordinary face conveyors. Also, there is a marked increase in the percentage of large coal. On long faces in the thicker seams scraper loading seems unable to deal with the large outputs handled by multiple face conveyors delivering into each other, though it is quite possible that further experience will develop a method which will overcome these difficulties. Scraper loading is not limited to thin seams, excellent results being obtained in veins up to about 5 ft. in thickness.

Washing and Screening Plants

A large amount of money has been spent during the past year or so by the British collieries for washing and screening plants. Over seventy-one million tons of coal, including two and two-thirds million tons of anthracite, were

Foreign Coal Mechanization

washed or cleaned in preparation for the market in 1929. This is 27 2/3 percent of the total quantity of saleable coal raised; the corresponding figure for 1928 is 25½ percent. Of the 71 million tons so treated, nearly 66 million tons passed through 546 washeries, and five and one-third million tons through 74 dry cleaning plants, the small balance being treated by a froth flotation process operated by seven plants. Dry cleaning plants rose from 53 in 1928 to 74 in 1929.

Table 3 gives particulars of the collieries equipped with washing plant of various types.

Electrification

It is estimated that in the 2,419 mines at work in Great Britain during 1929, the aggregate horsepower of electric motors in use was 1,753,704, as compared with 1,722,332 in 2,539 mines operating during 1928. The proportion of mines using electricity is thus 60.2 percent for 1929 against 57.8 percent for 1928. The average horsepower of motors installed rose from 1,174 in 1928 to 1,204 in 1929. It is of interest to note

TABLE I—COAL IN GREAT BRITAIN

Number and Description of Coal Cutting Machines in Use at Mines under the Coal Mines Act, 1911, during the last 10 years.

Year	Number of Machines in Use				Percentage of Electrical to total all types excluding percussive and rotary	Proportion of Coal output got by machine cutting	Number of Machines of each type both Electric and Compressed Air			
	Electrical	Compressed Air: Percussive and Rotary	Compressed Air: Disc, Bar and Chain	Total of all Types			Disc	Bar	Chain	Percussive and Rotary
1920....	2,153	1,898	1,020	5,071	67.9	13.2	1,254	700	1,216	1,901
1921....	2,257	1,963	1,039	5,259	68.5	14.1	1,247	724	1,317	1,971
1922....	2,395	1,943	1,096	5,434	68.6	15.3	1,213	795	1,479	1,947
1923....	2,745	2,184	1,230	6,159	69.1	17.2	1,240	882	1,841	2,196
1924....	3,046	2,405	1,379	6,830	68.8	18.7	1,213	921	2,281	2,415
1925....	3,134	2,181	1,335	6,650	70.1	19.8	1,086	842	2,524	2,198
1926....	3,114	2,085	1,313	6,512	70.4	22.0	978	767	2,645	2,122
1927....	3,478	2,252	1,386	7,116	71.5	23.3	863	740	3,209	2,304
1928....	3,586	2,204	1,341	7,131	72.2	25.9	793	635	3,391	2,312
1929....	3,787	2,193	1,381	7,361	72.5	27.9	614	622	3,791	2,334

Coal cutting figures relate to the end of the year.
Source: Report of H. M. Electrical Inspector of Mines for the year 1929.

COAL IN GREAT BRITAIN

TABLE II—CONVEYORS AND LOADERS—REGIONAL ANALYSIS, 1929

Inspection Division	Number of Machines: Electrical	Number of Machines: Compressed Air	Number of Machines: Total	Millions of Tons: Coal Conveyed	Millions of Tons: All Mineral got	Percentage of Coal Conveyed to total Mineral got: 1929	Percentage of Coal Conveyed to total Mineral got: 1928
						Percent	
Scotland	727	21	748	9.905	37.020	26.8	22.8
Northern	331	128	459	4.630	58.602	7.9	7.4
Yorkshire	120	306	426	4.260	46.720	9.1	6.1
N. Midland	265	122	387	3.890	33.367	11.7	7.3
N. Western	39	439	478	5.137	25.534	20.1	14.0
Cardiff and Forest of Dean	11	851	862	7.491	36.036	20.8	19.5
Swansea	5	55	60	0.399	13.610	2.9	3.3
Midland and Southern	119	34	153	1.438	14.916	9.6	6.6
Totals	1,617	1,956	3,573	37.150	265.805	14.0	....
Totals for 1928	1,228	1,628	2,856	27.976	244.944	....	11.4

Source: Report of H. M. Electrical Inspector of Mines for the Year 1929.

Foreign Coal Mechanization

that the latest coal fields—those in Kent, in the south of England—are run entirely on electricity. Certain of the Scottish mines which have a very high proportion of electrical equipment, two areas showing respectively 89.8 percent and 90.3 percent of the mines working on electricity.

Table 4 shows how this use of electricity is spread over the various operations below and above ground.

An important factor in the working of coal mining machinery is the fire-risk which is so severe in many British mines, and in the past this has precluded the use of electricity either for lighting or driving plant in a number of mines.

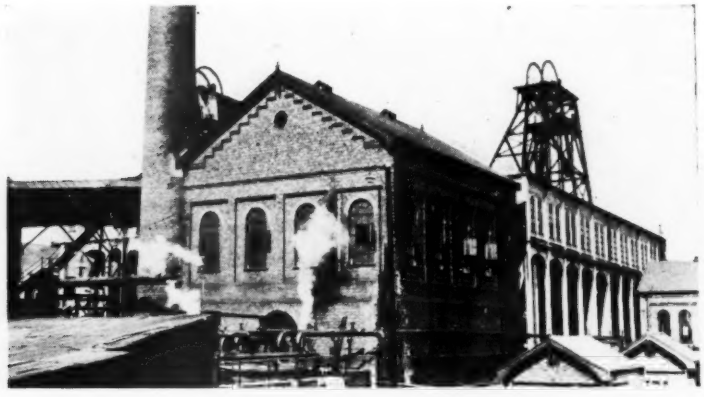
COAL IN GREAT BRITAIN

TABLE III—NUMBER OF COAL WASHING OR CLEANING PLANTS INSTALLED AND THE QUANTITY OF SALEABLE COAL WASHED OR CLEANED IN EACH COLLIERY DISTRICT OF GREAT BRITAIN DURING THE YEAR 1929—CLASSIFIED ACCORDING TO SITUATION OF PLANT

District	Number of Washing or Cleaning Plants Installed *			Quantity of Saleable Coal Washed or Cleaned			
	Washeries	Dry Cleaning	Froth Flotation	Washeries	Dry Cleaning	Froth Flotation	Total
Plants at Collieries treating coal from:				Tons	Tons	Tons	Tons
(a) Own collieries	534	75	7	60,679,011	5,090,826	120,861	65,890,698
(b) Other owners' collieries				1,140,887	232,368	14,609	1,387,864
	534	75	7	61,819,898	5,323,194	135,470	67,278,562
Plants at coke, etc., works	26	..	1	4,051,170	.....	1,464	4,052,634
Grand Total	560	75	8	65,871,068	5,323,194	136,934	71,331,196

* Including 16 washing and cleaning plants which were not in use during the year. There were 524 mines and 24 works at which these washing or cleaning plants were installed.

Source: Ninth Annual Report of the Secretary for Mines and the Annual Report of H. M. Chief Inspector of Mines, 1929.



Bentley Colliery, England, near Doncaster in Yorkshire

TABLE IV—ELECTRICAL EQUIPMENT AT MINES UNDER THE COAL ACT OF JUNE 30, 1929

	1928	1929
Total number of mines at work	2,539	2,419
Number of mines with electrical equipment	1,467	1,456
Aggregate Horsepower of Electric Motors in Use		
Underground:		
Haulage	374,600	381,399
Conveyors and loaders	18,270	18,821
Pumping	379,742	387,961
Coal cutting machines	98,427	100,940
Other portable machinery	3,145	3,937
Miscellaneous	23,476	25,058
Total underground	897,660	918,116
Above ground:		
Ventilation	115,076	116,237
Haulage	76,553	75,554
Coal washing or screening	148,713	152,993
Winding	148,980	151,829
Miscellaneous	335,350	338,975
Total above ground	824,672	835,588
Total horsepower above and below ground	1,722,332	1,753,704
Average horsepower of motors installed per mine at work and using electricity	1,174	1,204
Percentage of mines at work using electricity	57.8%	60.2%

GERMANY

Mechanization of German Coal Mines

THE mechanization of the German coal mining industry has gone forward rapidly, especially since the end of the inflation period. Progress in this direction has been so great that by the end of 1929, approximately 81 percent of her bituminous and anthracite coals (Steinkohlen), and very nearly 100 percent of her lignite were produced by machine.

Coal Production

The production of German coal* has shown a most satisfactory and steady gain since the end of the inflation period and in 1929, the last year for which complete figures are available, her production amounted to over 163 million metric tons or over 15 percent more than the 1913 output within her present boundaries.

* Anthracite and bituminous coals as distinguished from lignite.

The following table is of interest as showing the German production of coal in 1929 as compared with the two previous years and 1913.

TABLE I—GERMAN COAL PRODUCTION
(Present Boundaries)

Year	Metric Tons
1929	163,437,000
1928	150,876,000
1927	153,595,000
1913	140,753,000

About 98 percent of German post war coal has been produced in the State of Prussia, the output of the Prussian mines having amounted to over 159 million metric tons in 1929. Of this, 123,587,000 or about 79 percent was from the Ruhr district, the next most important area being Upper Silesia with a production of 22 million metric tons or less than 14 percent of the Prussian total. Detailed statistics on mechanization are available only for the Ruhr district. Since this is the most important producing area, and is representative of the situation in the entire industry, our discussion will be very largely limited to this field.

Mechanization and Concentration

The steadily increasing output of the German coal mines has been due partly to the increased use of mechanical equipment, and in part to the concentration of the mines into a smaller number of more effective units. The introduction of machinery has presented much greater difficulties than in the United States, due to the geological formation of the deposits. The mining conditions in the Ruhr district are relatively bad, since the coal does not lie in horizontal seams but is pitched at almost every angle. The structure is badly faulted so that continuous mining of a seam is exceedingly difficult. It is only rarely that really clean coal is found which complicates the problem of loading and sorting. Clearly to mechanize these mines has involved serious problems; the two

Foreign Coal Mechanization

most outstanding are: first, the actual mining of the coal itself, and second, its transportation to the pit-head.

Mining

The geological formation of the German mines in most cases makes the use of the larger coal cutters and similar machines infeasable. By far the greater part of the coal produced is cut by pneumatic pick hammers and similar tools. According to studies made by Mr. F. W. Wedding, of Essen, an authority on the Ruhr coal industry, only 2,519,000 metric tons or 2.2 percent of the production of this district was cut mechanically in 1913. By 1928, a year when the Ruhr production was approximately the same as in 1913, the machine cut tonnage amounted to 98,900,000 metric tons or 86.4 percent. In other words from 1913 to 1928, the amount of coal produced by machines had increased by almost 4,000 percent.

Table II based on official statistics of the Prussian government, gives in detail a comparison of the coal tonnage produced by machinery in the principal mining districts of Prussia during the years 1927 to 1929.

TABLE II—COAL IN GERMANY

	Millions of Metric Tons		
	Total Coal Production	Machine Production	% Produced by Machines
Ruhr District:			
1927	118.0	95.0	80.5
1928	114.6	98.9	86.4
1929	123.6	112.8	91.2
Upper Silesia:			
1927	19.4	3.3	17.0
1928	19.7	4.9	24.7
1929	22.0	7.9	35.8
Lower Silesia:			
1927	5.8	5.1	86.9
1928	5.7	4.9	86.0
1929	6.0	5.0	82.7
Lower Saxony:			
1927	1.3	0.4	32
1928	1.3	0.6	49
1929	1.5	1.0	70
Aachen District:			
1927	5.0	4.2	83.8
1928	5.5	4.8	87.2
1929	6.0	5.3	88.3
All Prussia:			
1927	149.5	108.0	72.2
1928	146.8	114.1	77.7
1929	159.1	132.0	83.0

From *Table II* it can be seen that these districts show varying degrees of mechanization, the highest being of course the Ruhr with 91.2 percent in 1929. Although the figure for Upper Silesia is relatively low, this may be attributed to the fact that it is not practicable to mine a large proportion of the coal by machine. The increase in the degree of mechanization in the Upper Silesian mines from 17 percent to 35.8 percent within a two years period is, however, extremely significant.

As stated, most of the machine cut coal is mined by pick hammers. This is very clearly indicated by *Table 3*, describing the cutting machines of various types in the Ruhr district as contrasted with Prussia as a whole for the years 1927 to 1929.

A study of the foregoing shows that the use of light pick hammers (weighing under eight kilograms [17.6 pounds] without pick) has increased much more rapidly than the heavier types. Electrically and compressed air driven coal cutters of both the bar and chain type are used wherever working conditions permit, although the bar coal cutter is losing ground in favor of the chain machine.

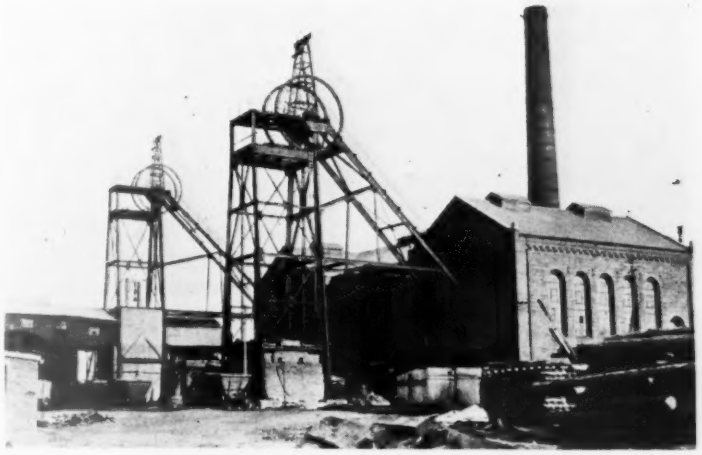
Loading, Conveying, and Haulage

The system of mining, principally longwall and geological formation, prohibits any extensive application of loading machines which have been introduced on such a large scale in the United States in recent years. A few of these, principally of American make have, however, been tried out with varying degrees of success in certain mines.

The shaker conveyor plays a dominating role in the German mines and these systems have been developed to a high point of efficiency. Their use is steadily increasing, and in 1929, 47.3 percent of the total Ruhr production was loaded by this system. The development between the years 1925 and 1928 is shown by *Table IV*.

A considerable amount of experimental work has been done with belt conveyors, but their use is limited to comparatively few installations. In typical Ruhr mines, the shaker conveyors are discharged directly into coal cars which are hauled to the main entry principally by compressed air locomotives where they are made up into larger trains and hauled to the shaft-bottom by compressed air or trolley-locomotives.

Much progress has been made in the mechanization of pit head installations, and in most of the mines, washing, screening, and loading is done automatically. There are in the Ruhr district



Haig shafts, Whitehaven, England

TABLE III—COAL IN GERMANY

Machine Class	Ruhr District 1927	Ruhr District 1928	Ruhr District 1929	All Prussia 1927	All Prussia 1928	All Prussia 1929
Light pick hammers	20,728	33,366	34,617	22,928	38,280	40,695
Heavy pick hammers	51,148	48,017	53,635	55,245	50,899	56,951
Other pneumatic tools	1,038	48	40	1,039	48	40
Bar coal cutters	516	463	322	655	614	484
Chain coal cutters	54	85	154	74	127	224
Other coal cutters	309	196	130	350	233	172
Post punchers	657	567	512	1,953	1,921	1,968
Totals	74,450	82,742	89,410	82,244	92,122	100,532

COAL IN GERMANY

TABLE IV—COAL LOADED BY CONVEYORS IN RUHR DISTRICT

Year	Coal Loaded by Shaker Conveyors, Metric Tons	% of Total Ruhr Coal Production	% Increase Over 1925
1925	38,276,855	37.0	....
1926	45,637,012	40.7	21.0
1927	49,473,209	41.9	31.0
1928	54,187,767	47.3	42.0

certain mines where coal is produced "untouched by human hands" from the time it leaves the coal face until loaded in railroad cars.

ELECTRICITY VERSUS COMPRESSED AIR

Although the use of electric power is gaining ground in German coal mines, compressed air still holds first place and will continue to do so as long as the greater part of the coal output is produced by pneumatic tools.

Electric drive is employed wherever possible underground, especially for machinery such as pumps and large hoists and winches, and for main haulage. The motive power for pick hammers, coal cutters, shaker conveyor motors, and other machines used directly at the coal face is, however, almost exclusively compressed air.

The danger of fire-damp explosions is not considered as a great deterrent to the use of electricity, since experience with explosion-proof equipment in the United States and other countries, has proved that this can be employed with safety even in gaseous mines.

Although the problem of unemployment in Germany is an exceedingly serious one at present, studies made by a prominent authority (F. W. Wedding of Essen) tend to show that the increase in mechanization of the Ruhr mines has created no serious problem in this direction. Although as before stated, the machine mined coal production of the Ruhr district increased by about 4,000 percent between 1913 and 1928, the number of miners employed in 1928 was only approximately 20 percent less than in 1913. That the workers thus released could be absorbed in other branches of industry, is indicated by the fact that in 1928, in the Ruhr an average of only 1,932 miners, or about 0.5 percent of the total workers of this district were reported as being unemployed.

LIGNITE—STRIP MINING

Germany has extensive deposits of lignite (Braunkohle) most of which are found in Central Germany and to the west of Cologne. Since most of these are comparatively close to the surface (10 to 90 ft. deep), they can be worked by the open-pit method. The seams are sometimes over 100 ft. thick. Most of the lignite mined is used either for the production of briquettes or for the generation of power in plants located directly at the mines.

Germany's production of lignite amounted in 1929 to 174,458,000 metric tons and was somewhat higher than her output of anthracite and bituminous coal.

The mining of lignite is one of the best examples of mechanical efficiency in the entire Reich and it may be said that the lignite pits are practically 100 percent mechanized. Enormous excavators and loading bridges have been developed which automatically remove the overburden and scoop up the lignite as they progress through the field. One of the newest and most impressive of these machines is the new "navy bridge" installed in November, 1930, in the Golpa mine of the Elektrowerke A.-G., the second largest power station in Germany. This enormous machine has a length of 1,214 ft. and weighs approximately 3,740 metric tons exclusive of electrical equipment and dredges. Its conveying bands have a capacity of 97,475 cu. ft. per hour. The stripping dredger can remove 26,487 cu. ft. of overburden per hour. The mining dredger has a coal capacity of 541 metric tons or 31,785 cu. ft. per hour. Cars for transporting coal have a capacity of 19.7 metric tons and those for cover removal 565 cu. ft.

Sources:

Conferences with officials of German National Coal Council (Reichs-Kohlenrat).

"Zeitschrift fuer das Berg-, Huetten-, und Salinenwesen im Preussischen Staate," Volume 78, 1930.

"Glueckauf," Berg-, und Huettenmaennische Zeitschrift, March-December, 1930.

"V D I," Zeitschrift des Vereins deutscher Ingenieure, July 5, 1930.

"The Recovery of Germany," by James W. Angell, New Haven, Yale University Press, 1929.

Visit to Golpa Zschornewitz Plant of Elektrowerke A.-G.

FRANCE

COAL CUTTING

GENERALLY speaking, coal is cut in the French mines by means of pneumatic picks, this method accounting for 75 percent of the total production. Coal cutters of the types better known in the United States are to be found only in the coal fields of the eastern district, particularly in the Saar and Moselle districts where there are 655 percussion cutters and 43 chain cutters.

Pneumatic hammer drills are used for drilling shot holes and for driving entries through the sterile country rock.

Due to the irregularity of the seams and the large number of seams exploited from a single shaft, there is much rock work to be done, and this is usually carried out with pneumatic hammer drills.

A few mines have adopted coal cutters of the long wall type for such of their faces as permit the carrying forward of a long face.

The mines of Lorraine are the only ones which have introduced coal cutters on anything resembling the American scale. In other districts a few such coal cutters are employed at least from time to time, but in no case outside of the Lorraine field is any substantial percentage of the production cut mechanically. A few, however, are used in the French Government mines in the Sarr valley.

LOADING

The only mechanical means of loading coal underground in the French mines is with shaking conveyors generally installed in galleries having a pitch of 10 to 25 degrees. The coal is loaded on to the shaking conveyors by hand.

In all other cases the coal is loaded directly into the mine cars either by shovel in the gallery itself or gathered in bins filled by inclined or vertical bucket conveyors. This latter method is generally employed in the metallic mines. In these latter instances where the seam pitches sufficiently steel sheets are put down along the face and the coal is slid down these to the gate head.

Where the pitch is not sufficient, shaking conveyors, pneumatically operated, are widely used. In some of the flatter seams a few belt conveyors have been installed. A few of the mines are making timid attempts to use scraper loading plants mostly for the handling of filling material. It is anticipated that in the future scrapers will be used more generally to replace conveyors.

No coal loading machines of any sort are used along the faces in the French coal mines.

For transportation along the main entries horses are used in the smaller mines and they are used quite generally for gathering even in the larger mines. These larger mines on the main entries have compressed air locomotives.

Reports received suggest that the mechanization of the French coal mines has been rendered difficult by the very stringent regulations enforced by government. Also the method of paying employes in the mechanized mines has not been such as to encourage the miners to accept mechanical devices. On the other hand a certain shortage of labor makes it difficult to recruit a full underground force, and has served to encourage the installation of mechanical devices that would facilitate production.

It would seem very difficult to mechanize the French mines, partly because of the irregularity and thinness of the French seams, and partly because of a psychological attitude on the part of the management of those properties.

BELGIUM

THE mechanization of coal mines of Belgium dates from after the war, and statistics bearing on this subject have been kept only since 1924.

CUTTING

The rapid development of mechanical coal cutting may be judged from the following figures:

	Total Coal Output Metric Tons	Coal Produced by Mechanical Cutting Metric Tons
1924	23,362,000	12,589,000
1925	23,097,000	14,439,000
1926	25,260,000	17,975,000
1927	27,551,000	22,238,000
1928	27,543,000	23,667,000
1929	26,931,000	23,959,000

The mechanical equipment employed in coal cutting included, in 1929, 151 cutting machines, and 21,872 pneumatic picks. The use of the cutting machine tends to remain stationary, but the use of the pneumatic pick is increasing steadily (14,041 picks in 1924, compared to 21,872 in 1929). In 1929, 22,143,290 tons of coal were produced by the use of pneumatic picks alone; 1,136,490 tons were produced by mechanical cutters alone, and 679,130 tons were produced by the combined use of cutters and picks. The use of the mechanical cutter is largely limited in Belgium by the thinness and uneven nature of the coal veins, so further development in the use of mechanical cutters is not to be, except gradually, as the richer veins of the Campine coal mines are opened up.

While no statistics regarding the mechanical cutting of coal existed before the war, it is estimated that not more than 10 percent of the total output was obtained by mechanical means, whereas the present percentage is just under 90.

Use of Drills for Driving Galleries

The use of automatic drills for driving galleries has been steadily increasing (6,365 drills in 1924; 7,219 in 1925; 7,527 in 1926; 7,952 in 1927; 8,330 in 1928; and 8,332 in 1929). At the present time 90 percent of the galleries in the Belgian coal mines are advanced by means of pneumatic drills (1,457,910 meters out of a total of 1,620,140 meters in 1929).

Transportation

Mechanical transportation has not yet been developed as extensively as in the case of mechanical cutting and drilling. From 1926 to 1929, the percentage of underground transportation in the galleries handled by mechanical methods increased from 19.3 percent to 29.6 percent. Underground hauling in the galleries in 1929 totaled 34,453,710 ton kilometers, of which 2,558,820 were effected by locomotives (72 gasoline locomotives, 11 compressed air locomotives, and 3 electric locomotives), and 7,661,220 ton kilometers by cables or chains. The total length of galleries equipped with cable or chain transportation amounted to 42,110 meters in 1926, increasing to 99,320 meters in 1929.

The transportation of coal from the point of cutting to wagon by the use of belt conveyors is also developing steadily. In 1926, out of a total production of 25,260,000 tons, 5,621,660 tons were transported to wagon by belts (22.3 percent). In 1929, 7,938,000 tons out of a total of 26,931,000 tons (29.5 percent) were thus transported.

The mechanization of transportation in the new Campine coal mines is far in advance of the older Belgian mines. Thus, for the mechanical transportation in galleries, 81.1 percent of the coal mined in the Campine was transported by locomotives (2.2 percent) or by chain or cable (78.9 percent) compared to the general percentage of 29.6. The entire output of the Campine mines is carried to wagon by belting, compared to 29.5 percent for the entire output of the older coal mines and the Campine mines together.

Mechanical Coal Loading

Mechanical coal loading has never been introduced in the Belgian coal mines, and the use of mechanical coal loaders is considered impracticable due to the thinness of Belgian coal veins. The average thickness of veins exploited in the South Basin (old coal basin) in 1929, was only 74 centimeters, while the average thickness of the coal veins in the Campine Basin amounted to 90 centimeters.

Foreign Coal Mechanization

THE NETHERLANDS

IN THE state owned mines about 95 percent of the coal is cut mechanically, pneumatic picks being exclusively employed in the soft coal, but about a dozen coal cutters are employed in the hard coal area.

The state mines operate almost exclusively on the long wall system, and the product is transported to the main headings by shaking conveyors, trials are also being made with belt conveyors. It is stated that 95 percent of the present production is mechanically cut.

Coal loaders are not used as it is reported the seams are too thin. The coal is shoveled into shaker conveyors by hand and transported along the long walls by these conveyors to the pit cars.

Halle Brown Coal Field, Alwine Pit, Germany

ITALY

ALTHOUGH the mine records for Italy indicate a small production of "anthracite" and "lithanthracite" the accuracy of these terms may be considered questionable.

Most of the fuel extracted is lignite and peat. There appears to be no field for mechanized underground mining in Italy.

The tonnage of coal imported is very important and there is a very interesting demand for machinery as used for coal handling from ship to shore and into cars.

SPAIN

ALTHOUGH coal is produced in 13 of Spain's 49 provinces, the one province of Oviedo accounts for 68 percent of the total production of nearly 8,000,000 tons and is understood to be the only coal fields where machine mining is employed.

Historically probably the first attempt was made by the Sociedad Hullares del Turon in 1914 when they installed some

air compressors and drills and in a certain degree electrified the mine. This work was completed in 1919. In 1921 the Sociedad de Penarroya installed several coal cutters of American manufacture with results that were considered excellent.

In 1922 the Sociedad Hulleras del Turon again took up the subject of mechanized cutting and learned that under cutting machinery could be employed successfully in mines where the veins were thick, horizontal and regular, while pneumatic drills could be employed more advantageously in thin, inclined and irregular seams. In some cases it was discovered that both types of machinery could be employed effectively together. They further discovered that by the use of machinery new mining methods could be employed which resulted in more rapid production and greater safety for the miners. Perhaps it can be said that this change in the method of mining was the really important development.

In that year one of the mines worked by this company, using one electrically driven under cutting machine and pneumatic picks, extracted 5,680 metric tons of coal per working day. In its various mines it had installed eight air compressors employing 823 horsepower, 42 drill hammers, 79 pneumatic picks, 2 hoists, 1 electric undercutter and 1 pneumatic undercutter.

Some of the other mines in Spain have been introducing various mechanical methods of mining since 1922, but it has not been found possible to get details. However, it is known that in 1929 the total number of pneumatic picks in use in the Oviedo mines was 817. Also, there were 16 shaking conveyors, 12 electric hoists, 12 undercutting machines. It is further known that in 1929 the Sociedad Hulleras del Turon employed 116 pneumatic picks in developing galleries, 415 for extracting coal, 3 Pick Quick undercutters, 13 shaking conveyors, 5 pneumatic hoists, and 12 air compressors, representing a horsepower of 1,468.

It is interesting to note that the production of coal per miner per day has expanded from 427 kilograms in 1922 to 840 kilograms in 1929.

Most of the veins in Oviedo have an inclination varying from 25 degrees to 80 degrees, and as the coal is extracted it is allowed to roll down this incline, into mine cars which are then pushed by hand, drawn by mules, horses, and even oxen to the main shaft. A few of the more productive mines have been electrified and under some cases electric locomotives are employed.

Mechanical devices for loading coal underground are employed in several of the larger mines, especially the Penarroys company properties, but apparently no statistics are available regarding the number of such installations or their capacity, and it is believed that they are still very limited and do not correspond to what is known in the United States as underground loaders.

According to the annual reports of the Director General of Mines, in 1924 eight of the coal mining companies in Asturias (Oviedo) were using mechanical methods of cutting, extracting, and transporting coal underground. About 11 percent of the total production of Oviedo in that year was mined by mechanical methods. In 1925, 430,857 metric tons, representing 10 percent of the total output of the Oviedo mines, were extracted by mechanical methods. The total number of mechanical hammers used in the Oviedo coal mines in 1924 was only 375. This number was increased to 740 by 1925 (359 drill hammers and 381 pick hammers). The Sociedad Hulleras del Turon, employing the largest proportion of this mechanical equipment, was enabled to increase its production by 30 percent in 1924 and 50 percent in 1925. In the same year the Sociedad Solway & Co. produced 50 percent of its output by the use of mechanical apparatus. In 1928, the Sociedad Hulleras del Turon, mentioned above, mined 87 percent of its total production by mechanical methods.

CZECHOSLOVAKIA

SINCE the war the coal mining industry in Czechoslovakia has been undergoing great changes, largely in the direction of consolidating certain of the mines into larger concerns. Also, in order to reduce production costs, there has been a tendency toward the adoption of mechanical methods, especially in the direction of cutting. It should be remembered that wage rates are low, approximately perhaps 15 cents an hour.

The following table indicates the tonnage cut by hand, also by machine, and reveals a very definite trend in the direction of mechanized cutting. In this connection it should be remembered that the expression "mechanized cutting" includes the various methods as, for example, where holes are drilled for blasting by power drills:

BITUMINOUS COAL				
Year	Hand Cutting Metric Tons	Percent	Mechanized Cutting Metric Tons	Percent
1925.....	6,709,848	53.4	5,849,144	46.6
1926.....	6,627,514	46.8	7,549,484	53.2
1927.....	5,662,642	40.4	8,353,658	59.6
1928.....	4,342,234	29.8	10,218,071	70.2
1929.....	3,833,609	23.2	12,687,848	76.8

As yet coal is not produced "untouched by human hand" in Czechoslovakia, but tests are being made in the Ostrava mines with a German type of underground coal loader. Usually at the headings coal is loaded by hand shovel.

In removing coal to the main shaft, various means of mechanized transportation are employed. The use of baskets and other primitive methods are now rarely seen in Czechoslovak coal mines. The most common mechanical installation is a shaker type of a conveyor which is used to advantage on slight gradients. On steeper gradients semi-automatic double-track endless rope haulages are extensively employed.

Coal removal from secondary headings if not carried on by endless rope or chain systems, is usually performed by manual labor, horses or combination of both. The main haulage to the shaft bottom is accomplished in nearly all cases by mechanical power. Electric locomotives are most frequently used for this purpose, compressed-air locomotives to a lesser degree, while those equipped with internal combustion engines are fairly rare.

General statistics showing the extent of power machinery used in Czechoslovak coal mines are available only for the Ostrava-Karvin bituminous coal mines and were compiled by the Czechoslovak Coal Mine Owners Association. These mines are said to be among the best equipped in the world.

COAL MINING IN CZECHOSLOVAKIA						
	1921	1925	1926	1927	1928	1929
Total output of Ostrava-Karvin bituminous mines (in thousands of metric tons).....	7,894	9,140	10,513	10,279	10,843	12,486
Percentage of coal cut by machinery.....	44.2%	58.7%	65.5%	74.4%	82.3%	88.8%
Total number of workmen.....	47,059	40,412	38,650	39,628	38,894	39,632
Air compressors in use.....	97	103	105	103	108	114
Total capacity of air compressors in cubic meters per hour.....	518,660	624,728	650,379	654,728	703,728	707,028
Power drills	2,866	3,208	3,110	2,909	2,717	2,619
Power picks	459	1,095	2,255	3,021	3,484	4,303
Undercutting machines fixed to columns.....	2,257	2,627	2,600	2,542	2,501	2,338
Undercutting machines mounted on wheels...	131	170	191	197	182	192
Conveyors: Number of driving motors.....	1,321	1,676	1,648	1,605	1,650	1,755
Length of conveyor troughs in meters.....	69,977	92,009	93,056	95,685	96,184	97,856
Underground locomotives	179	206	222	225	228	236
Underground rope or chain railways:						
Number	44	75	79	91	101	97
Total length in meters.....	21,155	30,246	27,679	23,520	31,342	31,990
Underground tubs or cars.....	40,237	38,789	39,476	38,829	39,339	40,237
Electric motors: Number	1,722	2,216	2,293	2,441	(a)	(a)
Total horsepower capacity.....	85,537	105,548	116,375	120,115	(a)	(a)

(a) Not available.

Foreign Coal Mechanization

POLAND

OUR correspondent in Poland had the good fortune to secure the cooperation of one of the directors of one of the largest coal companies in Upper Silesia, who furnished the accompanying table showing the progress made in mechanical cutting, not only in Poland but in German Upper Silesia, in the Ostraw-Karwin District of Czechoslovakia, and in the Ruhr (Germany) as well. This table is republished here because of the interesting comparisons it offers, and also as a check on data received from other sources describing conditions in these other coal fields.

In comparing the extraction by machinery of coal in Polish Upper Silesia with similar mining methods in other European basins, and especially in the Ostraw-Karwin and Ruhr districts, it should be noted that geological and economic conditions in Polish Upper Silesia, permit the use of machinery only within certain limits. The hardness of the seams and the nature of other rocks have an important effect on the possibilities of coal production with the aid of machinery. It remains a fact that the Polish Upper Silesian mines have many more harder seams than the Ostraw-Karwin and the Ruhr mines, and both from the geological and the economic viewpoint coal must be extracted mainly by the use of explosives. In the Ostraw-Karwin and the Ruhr basins conditions are quite different. The strata in these basins are thinner as a rule, and more readily permit exploitation with the aid of machinery. By this may be explained the greater development of machinery for the extraction of coal in both these basins. A similarity of operating conditions and consequently a similar development of coal production with the aid of machinery may be noted between Polish and German Upper Silesia, because of identical geological formations.

HUNGARY

PRESENT day Hungary produces annually about 7,000,000 metric tons of coal, most of which is lignite, black or brown, only 800,000 tons is liassic bituminous. This liassic coal occurs in steep distorted seams said to resemble the conditions found in the anthracite regions of the United States. There is little mechanized loading in this industry although some shaker conveyors are used in the seams that are not steeply inclined, and also in the thick seams, which are worked in horizontal cuts. Liberal use is made of air drills for stone work as well as of pneumatic picks for coal, more than two-thirds of the output being produced with the aid of this latter type of equipment.

In the black lignite mines, a fuel might be called sub-bituminous, the seams are thick, sometimes over 30 ft., and are worked by horizontal or inclined cuts. Both the pillar method and long wall are employed, and in the latter conveyors are commonly used. The output of this group of mines approximates 5,000,000 tons. One-fifth of the production of one mine or 300,000 tons is produced by conveyor long wall where 10-bar coal cutters are used.

Brown lignite occurs in seams of medium or narrow thickness, but yield about 3,000,000 tons per annum. These seams are badly faulted and pillar work with hand loading is the common practice. Some arcwall cutters are used in this work.

Mechanical transportation is common in the mines of Hungary. Air locomotives are used in the gassey liassic mines, rope haulage prevails in the lignite mines, but electric locomotives are also in use.

A recently equipped colliery in Belgium. No. 5 mine of Marcinelle-Nord

TABLE SHOWING NUMBER OF EQUIPMENT UNITS AND PRODUCTION MINED

Number of Equipment Pieces	Polish Upper Silesia				German Upper Silesia				Ostraw-Karwin (Czechoslovakia)				Ruhr Germany			
	1913	1925	1927	1929	1913	1925	1927	1929	1913	1925	1927	1929	1913	1925	1927	1929
1. Drilling machinery and hammers *	3,869	8,637	7,196	6,957	1,177	3,550	4,401	4,182	1,353	3,208	2,909	2,625	12,357	46,531	39,583	35,956
2. Mechanical pick-axes, weighing less than 8 kilos each	138	217	257	379	....	....	576	1,351							20,728	34,617
3. Mechanical pick-axes, weighing more than 8 kilos each	116	187	317	237	6	697	....	....	94	1,095	3,021	4,303	264	44,993		
					....	....	472	262							51,148	53,635
4. Bar coal-cutters	5	32	44	45	....	....	51	73	....	....	....	137			516	322
5. Chain coal-cutters	....	11	45	74	14	299	6	22	1,137	2,797	2,739	55	17	809	54	154
6. Pole coal-cutters	550	1,248	1,515	1,970	....	....	667	925	....	....	....	2,338	294	1,103	657	512
7. Small coal-cutters	....	2	3	5	....	....	8	9	....	....	....	17	...	447	309	130
8. Other machinery	....	....	....	....	....	....	....	....	....	....	....	†50	...	*	...	...
Total pieces	4,678	10,334	9,377	9,667	1,197	4,546	6,181	6,824	2,584	7,100	8,669	9,525	12,932	93,883	112,995	125,326
Annual production in thousands of tons	31,998	21,429	27,710	34,128	11,091	14,273	19,400	22,000	9,823	9,140	10,343	12,560	114,550	95,493	118,000	123,600
Amount mined by machinery listed in items 2-7, including in thousands of tons	2,410	8,747	7,180	10,553	‡	‡	3,300	7,900	2,628	5,365	7,930	11,273	5,728	45,894	95,000	112,800
Machinery mined coal in percentage of annual production.	7.5	17.5	25.9	30.9	‡	‡	17.0	35.8	26.8	58.7	76.6	89.8	5.0	48.1	80.5	91.2

* These figures are drilling machinery and hammers are given only for purpose of comparison.
† Of these, 17 machines are for operating moving floors by means of pneumatic pressure and 33 drills are for deep drilling and piercing.
‡ No further data available for the years 1913 and 1925, as statistics were not compiled at that time.

Foreign Coal Mechanization

Some figures drawn from the latest official statistics will illustrate the state of mechanization of Hungarian coal mines:

Number of coal cutters and picks operated by compressed air	513
Electric coal cutters	4
Compressed air coal and rock drills	679
Electric coal drills	8

Coal face machinery is almost exclusively air driven: 3,115 horsepower of steam driven, and 11,014 horsepower of electric driven air compressors, and 153 kilometers of air pipes being installed.

YUGOSLAVIA

THE coal industry in Yugoslavia is showing improved changes and development since the war. Although the coal reserves are probably important their development has not advanced very far as yet.

Cutting and loading machines are not used in the coal mines of Yugoslavia at the present time although mechanization along other lines has made some progress, notably in the field of drilling, screening, sorting, washing, drying and transporting.

As yet the industry has not developed to a point where it has been necessary to mine at any great depth. As a consequence all of the operations have been comparatively simple, also the quality of the coal is such that it yields rapidly to the hand pick. It is understood that the mine roofs are generally weak with the result that operators have hesitated to employ large machinery that might start falls through vibration. Furthermore, galleries are usually small and narrow and the steepness of the slope adds to the difficulties of working with machinery of any kind.

Although most of the coal and lignite is loaded by hand shovels, there are two or three mines equipped with belt conveyors and others have rope haulways at the surface connecting the mines with the railways.

It is quite probable that as the country develops the trend in the direction of mechanizing these mines will move more rapidly than heretofore.

RUMANIA

THE coal mines of the country are operated in a most primitive way. Practically all coal is mined by pick and shovel, loaded into small tram cars which are drawn to the shaft by animal power, then hoisted to the surface and dumped into cars. The industry is small, labor is cheap, the product of inferior character, all of which operates against mechanization.

CANADA

Maritime Provinces

THE provinces of Nova Scotia and New Brunswick produce about 7,000,000 tons of coal annually. Some of the mines extend under the sea as far as three miles and reach a depth of more than 2,000 ft. below sea level. The veins are generally pitching near the shore line but flatten out to some extent when deeper cover is reached.

The mines are equipped in a modern and substantial manner and are operating both by the room and pillar and long wall methods. Horses and electric haulage are used on the levels and rope haulage on the slopes. Surface treatment consists of screening and hand picking with some washing of slack for the manufacture of metallurgical coke. At the present time about 90 percent of the output is undercut using both the radial and the chain type machines. Gaseous conditions have in the past discouraged the use of electric equipment so that most of the cutting is done with compressed air.

Mechanical loaders have not been used successfully but there is now quite a trend toward the use of conveyors with hand shoveling—particularly in the long wall workings.

The Prairie Provinces

The Prairie provinces produce nearly 8,000,000 tons of coal annually. Chain cutters and radial cutters are in general use but machines have not yet been applied to the other face operations. The cars are usually handled by horses to the main haulway which is generally equipped with a rope haulage. The jack hammer or puncher pick is being used experimentally and gives promise of success.

British Columbia

The coal production from British Columbia is approximately 2,000,000 tons annually. In 1929, 8.38 percent of this coal was cut by machine and in 1930, 18.5 percent was machine cut. Both compressed air and electric drives are employed. About 230,000 tons of coal was carried from the face to mine cars by conveyors—400,000 tons were hauled underground by electric locomotives—and 300,000 tons by compressed air locomotives.

BRAZIL

THE mine of outstanding importance in Brazil is the Sao Jeronymo where the daily production averages 800 to 900 metric tons. There are no underground mechanical loading devices in that mine. At present the mechanical equipment is limited to compressed air drills for stoping. Underground transportation in the galleries is provided by electric locomotives which haul trains of dump cars to a central shaft and an elevator raises the loaded cars about 300 feet to the surface.

There are elsewhere in Brazil mines of lesser importance where it is understood that the transportation is by means of animal drawn cars, and in one of these compressed air drills for cutting have recently been introduced. Otherwise it is understood that the mining methods are primitive.

CHILE

THE key industry of Concepcion Province is coal, most of which is mined from under the Pacific Ocean at depths as much as 4,500 ft. below sea level. Mechanical mining more or less along American lines was introduced as early as 1916 in two of the most progressive mines. Since that time more than 30 machines, such as coal cutters, top cutters, channeling and long wall machines, electrical and air operated, have been imported from the United States. The two outstanding mines are those at Coronel and Lota. Both of those have adopted American technic as far as working conditions will permit, and have used machinery correspondingly. The combined output of these two mines accounts for practically the total production of Chile.

In these mines where the veins are not too steeply pitched, chain type undercutters with a 4 or 5-ft. cutter bar are used on the long wall method operating on a face sometimes as great as 300 ft. Compressed air drills are used to prepare for blasting and the miners move the broken coal to a belt conveyor, which conveys the coal to the car loaders. An endless haulage cable takes the cars to the bottom of the incline leading from the mine and another cable raises them to the surface where they are dumped onto a shaker screen.

JAPAN

THERE are in Japan a total of 100 known collieries which are found in two principal coal fields, one in the northern most Island, Hokkaido, and the other in the southern Island, Kiushiu.

Of the above mines 30 percent have vertical shafts, 70 percent adits, or inclined tunnels. The deepest mine operates at a depth of 1,350 ft. Of the above mines, 35 percent employ the long wall method, 14 percent the pillar and room method, 44 percent a combination of both systems.

Latest figures reveal a total of 970 rock drills, 94.3 percent of which are pneumatic, 5.1 percent are electric. At the present time there are in operation 500 coal cutters.

Mechanical appliances are used only to a very limited extent for handling coal underground. There are some shaking conveyors and also a water type conveyor.

Fifty percent of the coal is transported underground by manual or manpower, 6 percent by horses, 27 percent by electric power. Twenty-eight percent of the sorting is by a dry picking method and 72 percent by the wet or washing method. Sixty-five percent of the washers are jiggers and 14 percent are blackett, an English make of trough washer.

CHINA

MANCHURIA

THE only large mining operations of consequence in Manchuria are at the Fushun mines, which produce almost 8,000,000 tons of coal per annum most of which is from an open cut mine. The deposit is 10 miles long, one and a-half miles wide at its thickest part, about 437 ft. at its thinnest—about 60 ft., and as a consequence creates a unique mining problem. At the present time most of the mining is by means of power shovels, although there are two pits operating in this deposit.

Elsewhere in Manchuria are numerous small coal mines under Chinese control, but it is understood that all of these employ only the crudest methods and no modern mechanical equipment.

NORTH CHINA

In North China are two important mines; the Kailan Mining Administration produces about 5,000,000 tons annual. Peipiao Coal Mining Company is a newer operation.

The Kailan Mining Administration has so far found hand labor more advantageous for cutting and handling coal underground under existing conditions than various mechanical methods of which they have knowledge. They have installed a power plant, have seven electric locomotives for haulage, but all cutting and handling in both mines is still done by hand. The Mining Administration plans to experiment in the near future with pneumatic picks, and stone drills, and now have a program in hand for the gradual electrification of the main haulage system. This program may extend over a period of more than 10 years. The Peipiao mine is also expected to make similar experiments, and it is expected that mechanical methods will be employed more and more, although as yet there is little to report.

SOUTH CHINA

Although there is abundant evidence that plenty of good coal is to be found in South China, particularly in the Province of Kwangtung and Kwangsi, there is as yet practically no development and coal consumed in this district is largely imported from Japan and North China. In the future important mining developments may be expected in this area.

INDIA

ALTHOUGH India produces over 20,000,000 tons of coal a year most of it is produced by hand. While the Indian wage rate is very low, the efficiency of the Indian coal miner is also low, and the cost of production low. However, there is a very large labor turnover and certain other local conditions that have encouraged operators to give careful study to the desirability of mechanizing the various collieries.

A typical example of mechanization of Indian coal mines may be seen in the Jamadoba and Kustore Collieries, in the Bihar and Orissa-Bengal fields, where chain cutting machines are used with electric drills.

Foreign Coal Mechanization

Lateral haulage is accomplished by means of 6-ton trolley-type locomotives, a 500-ft. cable being employed in movements within the rooms and the trolley in the galleries. At present only 6-ton locomotives are employed, but with the extension of the workings it is anticipated that for the main haulage these will be replaced by 20-ton units.

AUSTRALIA

THERE are no mechanical loaders used underground in any of the coal mines in Australia, although great efforts have been made to have them introduced. The following table indicates the position with regard to equipment of coal cutting:

Transporting mineral from a mine in the Caucasus

At present, loading is done by hand, two men loading a 90-cu. ft. capacity car (2.8 to 3 tons) by means of baskets in 1 hour and 43 minutes. These cars are of composite construction, steel sides and wood bottoms, 5 ft. wide and 10 ft. 6 in. long, 30 in. rail height and equipped with roller bearings, the gauge being 3 ft. 6. in.

In the near future, however, it is proposed to install scraper loaders when it is anticipated that all the coal will be loaded at a great reduction in labor, as a crew of six men operating a loading machine will be able to accomplish the manual labor of about a hundred. When these loaders are installed, the cutting machines (which also carry the drills) will be fitted with caterpillar trucks, thus also eliminating the necessity for track laying in the rooms.

Class of Machine	1919	1920	1927	1928
Disc.	...	...	...	...
Percussive	104	98	200	205
Revolving bar	...	...	2	...
Chain breast	178	179	116	115
	282	277	318	320

It thus appears that less than 25 percent of the Australian coal is cut by machine. We have not been able to find any very satisfactory statistics regarding mechanized hauling, but it is understood that there are three or four electric locomotives in the various Australian mines.

The Australian mines have not been engineered in such a way as to facilitate the introduction of mechanical equipment. For example, the gauge of the

Foreign Coal Mechanization

track in most mines is 24 inches, the clearance at the sides for cars is not liberal, and other practical difficulties will probably be encountered when efforts are made to mechanize these properties.

NEW ZEALAND

MECHANICAL coal loaders are not used in any New Zealand coal mines, and it is only within the last five or six years that coal-cutting machines have been employed. There are five of these now in the Waikato district, two in the Taranaki district, and two in the Greymouth district. These are all Arcwall cutters.

The coal when mined is shoveled by hand into cars, 12 hundredweight capacity or upwards, which are then pushed by hand to the entry head, at which point they are reached either by horses or winches, until the main rope road is reached. From that point they are hauled mechanically to bins.

AFRICA

IN South Africa there are 69 collieries employing about 1,630 Europeans and 33,450 natives and Indians.

The following table shows the number of coal cutters in operation in December, 1929:

Province	Electricity	Number of Machines Compressed Air	Total	Percentage of Work Done to Total Tonnage Mines by Collieries Using Coal Cutters
Transvaal	86	202	288	97.61
Cape	....	...	...	.....
Orange Free State	....	43	43	95.00
Natal	96	94	190	71.76
Union of South Africa	182	339	521	86.74
1928	148	*460	608	82.13

* Source: Annual Report of the Government Mining Engineer for the Year Ended December 31, 1929.

It will be noted that the number of cutters in use indicate a decrease as compared with 1928. This must not be construed as representing a tendency to replace machines with hand labor, but rather indicates a trend from the pneumatic machines to the chain machines which have greater capacity.

There also appears to be a tendency to utilize more generally cutters of the arcwall type. The question of installing underground conveyors has been engaging the attention of coal mine officials for some time, and some have been impressed with the success resulting from such installations in other parts of the world. At present almost all underground haulage is by means of the continuous rope method.

It would seem that in South Africa the whole subject of mechanization is receiving careful attention and important developments along these lines may possibly be anticipated.

JAVA

CUTTING machines are only used in the mine Goenoeng Batoe Besar of the Mining and Trading Company of the same name. These are the electrical shortwall machines of the bar type, of which seven are being used in the mine, and which supply about 80 percent of the total coal production of the mine. Experiments have been conducted in other privately owned mines and in the government coal mines with cutting machines, but they have not been introduced and the "pick and shovel cutting" is applied everywhere.

Mechanical transport, except over long distances, is only used in the government coal mines Ombilin, Boekit Asem and Poeloe-Laoet, namely by means of shaking chutes, whereas in the mine Rantau Pandjang of the Mining Company Parapattan (Borneo) an electrical loading machine is used for driving the rock entries. The transport from the face to the shaking conveyors or the mine wagons is done by hand labor in rattan baskets.

In the Indian coal mines there are being used for the transport over long distances, electrical locomotives, endless cables, compressed air locomotives, and Diesel locomotives, whereas for the overground transport steam locomotives are also used by the last-mentioned company.

ANALYSES OF WYOMING COALS

The publication of Technical Paper 484, "Analyses of Wyoming Coals," is announced by the Bureau of Mines. The paper is the sixteenth issue of a series devoted to the analyses of the coals of the different states. The paper contains chapters on the Wyoming coal fields; methods of mining and preparation of coal; production, distribution and use of Wyoming coals; and the relation of mine samples to commercial shipments.

The coal resources of Wyoming are enormous and have scarcely been tapped. With original reserves of bituminous and subbituminous coal estimated at 670,723,000,000 tons, production to the end of 1928 totaled 228,441,000 tons. The latest final figures cover the year 1928, when production amounted to 6,571,683 tons, valued at the mines at $17,363,000, or an average per ton of $2.64. The 4,843 employes of the 38 mines of commercial size that were active in 1928 worked an average of 214 days, producing an average of 6.35 tons per man per day.

Copies of Bureau of Mines Technical Paper 484 may be obtained from the Superintendent of Documents, Washington, D. C., at a price of 25 cents.

A LOUD-SPEAKER SIGNALING DEVICE FOR SHAFT MINES

A new signaling device for shaft mines with a talking circuit between cage or skip and the engine house is described in an information circular of the United States Bureau of Mines, written by L. D. Stewart and E. V. Potter, Jr.

There has been a great need for a signaling system that could be operated from the cage and several successful methods have been developed. However, none is as complete as the method described, which is believed to be the only one with a talking circuit, a feature which in itself is a great advantage.

Two loud speakers are installed in the engine house—the cage loud speaker, which is always in service, and the skip speaker, which is used when required. With this system it is possible to signal the engineer from both cage and skip from any place in the shaft, whether or not the cage or skip is moving, and it is possible at all times to talk with the engineer by using the telephone.

Another added feature is the safety switch connected with the rope in the bonnet of the cage. This switch is normally open, but closes and automatically gives the stop signal whenever the rope slacks, which is a decided benefit if the cage becomes stalled in the shaft when being lowered.

A full description of the electrical circuit, apparatus required, and cost of installation is given in Information Circular 6487, "A New Signaling Device for Shaft Mines, With Comments and Suggested Modifications," copies of which may be obtained free.

OPEN-PIT MINING METHODS

An interesting discussion of power-shovel operation is provided in a recent paper on "Open-Pit Mining Practice at Santa Rita, N. Mex.," by H. A. Thorne, issued as an Information Circular 6412 by the Bureau of Mines.

The ore bodies occur in highly altered porphyry and sediments under an overburden whose variable thickness ranges from nothing to 150 feet.

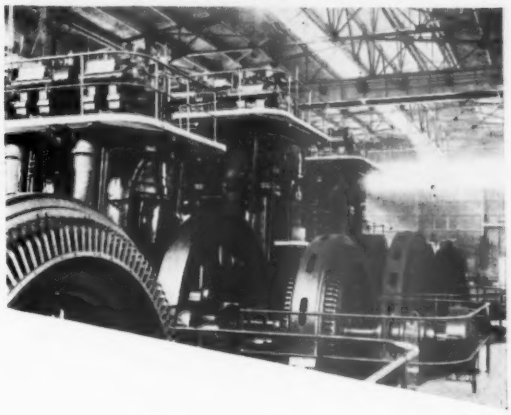
PRACTICAL OPERATING MEN'S DEPARTMENT

METALS

Practical Operating Problems of the Metal Mining Industry

GUY N. BJORGE, Editor

ACCIDENT PREVENTION WORK at the Phelps Dodge Corporation



Concentrating Mill and Diesel Engine Power Plant, Copper Queen Branch, Phelps Dodge Corporation

By H. C. Henrie*

SAFETY and accident prevention work was first inaugurated by the Phelps Dodge Corporation in 1913 when safety departments were organized and safety engineers employed by several of the subsidiary companies.

Prior to the year 1925, the system of administering the work had largely been one of appointing a safety engineer to supervise the work and to see that accidents were eliminated in the mine or plant. While this system resulted in a gradual reduction in the accident rate from year to year, in general the results secured were not satisfactory. There was a tendency on the part of the organization to regard accident prevention work as the safety engineer's job and this lack of cooperation resulted in shifting the entire burden of administering the work to the safety department. It was evident that accident prevention work was not a one-man job, but a job for the entire organization and if satisfactory progress were to be made it would be necessary to reorganize the plan for administering the work. This reorganization was effected in January, 1925.

The purpose of this paper is to discuss the plan of safety organization which was inaugurated when the work was reorganized in 1925, and to outline some of the methods which have proven successful in bringing about a very gratifying reduction in the accident rate since that date.

* Manager, Labor Department.

Plan of Safety Organization

THE plan which was inaugurated for administering accident prevention work parallels very closely the safety organization plan of the United States Steel Corporation, and was designed to delegate a definite responsibility to the supervisory staff and make accident prevention work an integral part of operation.

The safety and accident prevention work of the corporation is administered by the following committees:

(A) Corporation Safety Committee.
(B) Plant General Safety Committee.
(C) Departmental Safety Committees.
(D) Plant Safety Engineers.

V 17 7 JUL 31 XUM

Personnel and Functions of Safety Committees

(A) *Corporation Safety Committee*

This committee consists of the vice-president and general manager of the corporation, who is chairman of the committee, the managers of each subsidiary company of the corporation and the manager of the Labor Department who is secretary of the committee.

In general, the Corporation Safety Committee is responsible for the successful conduct of the accident prevention work of the corporation. Meetings of this committee are held three times a year, and are arranged so that the committee visits and inspects the safety work of the various subsidiary companies in rotation. At these meetings the accident records of the corporation are reviewed and discussed, methods for improving practice, stimulating interest and new innovations are studied.

By means of this committee a definite and uniform safety policy has been developed, methods and practice at the various branches have been standardized, and efforts directed to a definite objective. Experience of the past six years indicates that the Corporation Safety Committee is largely responsible for the excellent progress which has been made.

(B) *Plant General Safety Committee*

The Plant General Safety Committee consists of the plant manager, who is chairman of the committee, the plant safety engineer, who is secretary, and the various superintendents and department heads of the plant organization.

The Plant General Safety Committee is responsible for the proper administration of accident prevention work of the subsidiary company. Meetings are held monthly, at which time the plant accident record is reviewed, safety recommendations and suggestions acted upon, methods for improving the work discussed, and special hazards and existing practices are studied.

(C) *Departmental Safety Committees*

There has been established in each operating department a Departmental Safety Committee, consisting of the superintendent or departmental head, who is chairman of the committee, the plant safety engineer, who is secretary, three to five workmen chosen to serve for a period of three months, together with an equal number of foremen or bosses, appointed to serve for the same period of time.

The chief function of the Departmental Safety Committee is to bring the workmen into direct contact with the work and thus secure their cooperation. Meetings are held bi-monthly, at which time the departmental accident record is reviewed, accidents which have occurred are discussed and classified, departmental hazards, practices and working conditions are studied. These committees make frequent inspections of the department to study operating practice and conditions.

One of the functions of the Departmental Safety Committee is to discuss and formulate safety rules and regulations, and to establish penalties for their violation. It is generally conceded that men will obey rules they have helped to formulate with better grace, and are less resentful of penalties enforced for the violation of such rules than where the rules are forced upon them by those in authority.

(D) *Plant Safety Engineers*

The plant safety engineer compiles all plant accident reports and statistics, and acts as secretary for all plant safety committees.

The safety engineer personally investigates every lost-time accident which occurs and renders an independent report covering the same. He is also required to make frequent safety inspections in order to study existing practice and special hazards and to recommend new methods of practices for improving the work.

The Safety Department has full charge and direction of first-aid and mine-rescue training, and in general acts as a service department for the plant.

SINCE the adoption of this plan, we have proven to our own satisfaction that the committee system is basely sound and when properly administered results in securing the cooperation of everyone in the organization—management, supervisory force and workmen, in the effort to eliminate accidents.

Due to the active participation of the executive officers and management of the company in the work, the entire organization was soon convinced that the management was sincere in its desire for improved safety work and the elimination of accidents, and that safety work must be considered a major operating problem.

It has been especially interesting and gratifying to note the interest and spirit of cooperation prevalent in the various departmental safety committee meetings. Since the inauguration of this plan, one departmental committee representing an operating department employing less than 100 men has submitted nearly 1,000 safety suggestions and recommendations during the past five years.

Accident Reports

EXPERIENCE indicated that accident prevention work can not be intelligently and effectively administered without ample and accurate information covering the accident experience of the company and its various departments or operations. It was also evident that accident reports and other statistical data must be compiled in such a manner that the information could be easily understood by the average workman.

The number of lost-time accidents and the total shifts worked by the department or company was adopted as the method of measuring frequency results, the accident rate being expressed in "accidents per 1,000 shifts worked." All accidents which resulted in a loss of time to the injured employe are included in the comparative accident reports.

The following accident reports are compiled each month:

(A) *Report of Lost-Time Accidents*

Every lost-time accident is investigated and analyzed in order to ascertain just how the accident occurred, the condition or parties responsible for the accident and the corrective measures necessary in order to prevent a similar accident.

(B) *Record of Branch and Departmental Lost-Time Accidents*

In this report the accident record of each department of the various subsidiary companies is shown under the following departmental headings: Underground Mining, Surface Mining, Crushing and Concentrating, Smelting, Machanical and All Shops, Miscellaneous Surface Departments, and the Total Departmental or Branch Record.

Information is shown under the following headings: Number lost-time accidents for month, Accident rate per 1,000 shifts worked, for the month; Number lost-time accidents year to date, and accident rate per 1,000 shifts worked year to date.

(C) *Accident Severity Record*

This report indicates the time lost on account of accidents by each branch during the month and for the year to date, and also the percentage of time lost to total shifts worked.

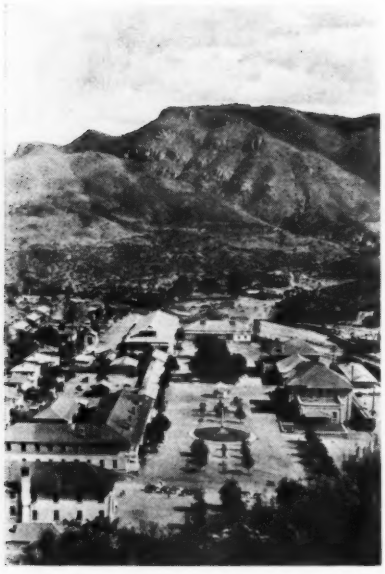
(D) *Classification of Accidents*

This report records the fatal, serious, and slight accidents of each branch, and also indicates the accident rate in each classification per 1,000 shifts worked by the branch. In addition, the accidents of each branch are classified as to responsibility for the accident, under the following classifications: Fault of injured employe, Fault of fellow employe, Fault of direct supervision, Fault of indirect supervision, Faulty tools or equipment, and Trade risk. The percentage of the total branch accidents classified to each cause is also shown.

General view of Concentrating Mill, Morenci Branch, Phelps Dodge Corporation, Morenci, Arizona

Sacramento Steam Shovel Pit, Copper Queen Branch, Phelps Dodge Corporation

V17 7 JUL 31 XUM



General Offices, Hotel and Plaza, Moctezuma Copper Company, Nacozari, Sonora, Mexico

(E) *Classification of Accidents as to Cause*

This report records the lost-time accidents as to cause, such as Fall of ground, Handling rock or ore, Fall of persons, etc. The information embodied in this report is especially valuable in indicating just what operations or conditions are responsible for the majority of the accidents which occur and the hazards which must be given special attention.

THE question as to what constitutes a lost-time accident is an important one. In every industrial plant there are individuals who are prone to lay off as a result of a trivial or even an imaginary injury, whereas the great majority of workmen often vigorously protest against laying off and losing wages if it is at all possible for them to resume their duties. This is a situation which must be handled in every plant. It is obviously unfair and uneconomical to allow the malignerer to lay off and receive compensation when he is able to work; it is also poor policy to allow an eager and enthusiastic workman to return to work when by so doing his injury may be aggravated and complications, such as infection, result. In order to provide a uniform policy it was decided to have the chief surgeon personally examine every injured employe and if in his judgment the injured employe is able to return to work, he is released for work. Unless an injured employe presents this release, signed by the chief surgeon, he is not allowed to resume his duties; conversely, if the employe refuses to accept the decision of the chief surgeon the company will protest his claim for compensation and the accident is not classified as a lost-time accident. Since it has always been the policy of the Medical Department to give the employe the benefit of any doubt, little or no difficulty has been experienced from employes of the malignering type.

A lost-time accident was defined as follows:

(A) If the injured employe is unable to report for work the shift immediately following the accident, the accident shall be classified as a lost-time accident.

(B) If the injured employe is released for duty by the chief surgeon and reports for work the shift immediately following the accident, he must be able to resume his duties at the occupation he was employed on at the time of his injury at the beginning of the fourth shift following his accident, otherwise the accident must be classified as a lost-time accident, irrespective of whether the injured employe has lost any time or not.

FOLLOWING the standardization of the methods of preparing accident reports, large bulletin boards were erected at conspicuous places in each plant for the purpose of bringing the corporation, branch and departmental accident records to the attention of the employes. This innovation resulted in stimulating considerable competitive interest in the accident records made by the various companies.

Several safety competitions whereby the various companies compete for safety trophies were inaugurated and have been powerful factors in maintaining interest in the work.

A handsome bronze tablet, which is a permanent trophy and known as the James Douglas Safety Memorial Trophy, is competed for annually and is awarded to the branch having the best accident record during the year. Branch standings are computed on a frequency basis and expressed in "number of lost-time accidents per 1,000 shifts worked."

Another branch competition is conducted on the severity basis. The branch having the least number of days lost on account of accidents in proportion to the total days worked by the employes of the branch during the year is awarded the Cleveland H. Dodge Memorial Trophy. In compiling branch records on a severity basis the lost-time accidents are tabulated in accordance with the scale adopted by the International Association of Industrial Accident Boards and Commissions.

There has also been established a departmental competition whereby the departments engaged in the same character of work and subjected to the same occupational hazards compete for departmental trophies which are awarded annually. This competition is conducted on the frequency basis mentioned above, and suitable trophies are awarded to the department of the corporation having the best accident record for the year in each of the following divisions: Underground Mining, Surface Mining, Smelting, Concentrating, Mechanical, and Surface Departments.

Protective Measures

AFTER the safety organization plan has been inaugurated and the accident experience of the corporation compiled on a uniform and comparable basis, three principal methods of procedure were stressed, namely, engineering, education and enforcement. Engineering methods quite largely consisted of recognizing accident hazards, both actual and potential, and eliminating the hazard. Unsafe appliances and equipment were made safe, moving machinery properly guarded, dangerous conditions eliminated, and, in general, obvious hazards corrected.

An analysis of the accident experience of the corporation indicated that a very large number of disabling accidents were due to eye, head or foot injuries. The majority of eye injuries occurred in connection with the use of hand tools, the operations of picking, sledging and the handling of material where mud, water or dust was present were a prolific source of this class of accidents. After considerable investigation and study of the problem, the use of goggles while performing certain classes of work was made compulsory. Goggles of the wire screen type were selected for underground work, for surface work the usual glass lens type of goggle was adopted. The use of goggles has resulted in practically eliminating eye accidents. For example, one company had 103 eye injuries in the year 1924, in 1928 none occurred and last year there was only one eye injury at this mine.

In order to reduce the number of head injuries the use of safety hats was made compulsory in the various underground departments. This practice has had the effect of greatly decreasing the number of head injuries and in several instances, the use of the safety hat prevented a fatal accident.

The use of safety toe shoes and bootees was insisted upon as a protection against falling objects and material, and safety spats, designed to protect the foot and ankle, were furnished to workmen engaged in grizzly operations.

Due to splashes of molten metal, sparks and hot calcined material igniting the clothing of employes at the reduction works of the company and resulting in a number of serious injuries, the wearing of woolen underclothing by employes of the reduction department has been insisted upon.

Typical safety educational posters. Employes are selected to pose to illustrate the various hazards in order to give added attraction to the bulletin board

The use of protective wearing apparel in connection with mining operations is largely a matter of educating the workmen relative to the protective features of these articles, and after several instances were noted where the employe was saved from a serious or fatal injury due to this protective apparel, little difficulty was experienced in getting the workmen to accept this innovation.

Educational Methods

OUR experience during the past five years indicates that the safety educational program is probably the most important and yet the most difficult phase of accident prevention work. In final analysis, the object of an educational program should be to develop such a spirit of safety consciousness in the organization that every employe is looking for conditions and practices that may lead to an accident, and yet at a first glance appear to be safe. With this objective in mind it was evident that the first step in the educational program was the recognition of what constitutes unsafe practices and the correction of them.

All accidents which occur are first investigated, then analyzed and discussed with the various safety committees. This policy has proven invaluable in educating the organization as to where, how and why accidents occur and the procedure necessary to prevent the occurrence of a similar accident. By means of this analysis of accidents, numerous cases were noted where employes were injured while doing their work in an unsafe or wrong manner. This condition was not confined to any one operation but was general and prevalent in all departments. Usually we learned after the accident had occurred that the work was being performed in the wrong manner and that no one had ever instructed the workman in the right way to do it.

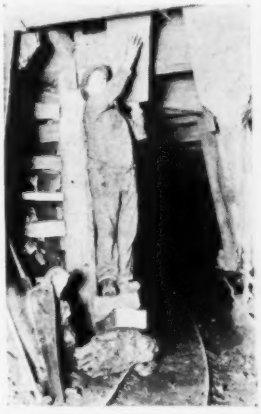
This condition presented a new point of view to the safety committees, since previously it was quite common for a foreman or boss to excuse an accident on the ground that the injured workman was an experienced miner and therefore should have known just how to proceed. As a matter of fact, in general the average workman receives little or no instruction. Many of the practices which he uses were taught to him by his partner or picked up from experience, with the result that many of them are inefficient and faulty.

After realizing that unsafe practices, on which the workmen had never been

HOW TO START A MINE CAR—"ALWAYS PUSH—NEVER PULL"

When moving a car from the chute always "PUSH IT"—Never pull the car.

Five men were recently injured by pulling the car over their feet.

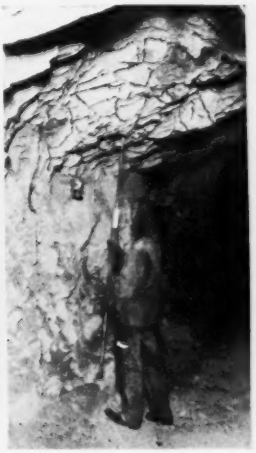


ALWAYS WORK FROM A SAFE PLATFORM

Be sure that whatever you are standing on is substantial. You cannot watch your footing and work too.

An insecure working platform is likely to cause you to lose your balance.

By placing blocks together in a careless manner, you are subject to a fall and an accident.



NEVER STAND DIRECTLY UNDER THE GROUND YOU ARE BARRING DOWN

Proper position when barring down. Always examine the back before you start. Have the bar at an angle that will allow the material to fall without striking you.

When barring down, rock that is cracked or loose a considerable distance from the bar point is liable to fall. Do not bar down with the bar in a vertical position.

A man barring down with his bar in a vertical position is liable to serious injury. The same operation could be done safely if he stood back in the clear.

First Aid Contest, Stag Canon Branch, Dawson, N. Mex.

properly trained or instructed, were a major source of accidents a job analysis of the different operations was made. This standardization of practice was accomplished by having committees, composed of the departmental superintendent, foremen and bosses, study the movements connected with a certain job or operation and agree on which was the most efficient and safest method of performing the work. When a standard method was decided upon, the method outlined was placed into effect and the workmen were instructed in this method of performing their work. By having the foremen and bosses make the job analysis, and agree on what should be the accepted method of doing each operation, they automatically put their stamp of approval on the method, with the result that the training program is entirely in harmony with their point of view.

CONTRARY to the opinion expressed by many to the effect that a standard method of procedure can not be applied to mining operations, the various companies of the corporation have been able to work out such a standardization covering many of the more common operations, and this standardization work is being constantly extended.

The responsibility for seeing that proper instruction was given to the workmen was placed squarely on the shoulders of the foremen and bosses.

In addition to instructing the workmen how to perform their work in a safe and efficient manner, every employe was required to pass an oral examination covering the safety and operating rules of the company.

Mine foremen, assisted by the safety engineer, make a practice of talking to small groups of workmen during the lunch hour. These discussions generally center around conditions, unsafe practices, and methods of performing the work in the particular section of the mine represented by the group in question. This practice has also been followed in the various mechanical shops.

The natural sequence after having recognized the hazard, then standardizing practice along safe and efficient lines, and properly instructing the workman, is to have ample and proper supervision in order to see that the correct methods are properly understood and carried out. Foremen and bosses must not only be trained to accept their safety responsibility but must be held responsible for unsafe conditions and unsafe methods of doing work by the workmen under their supervision.

After the educational program has been developed to this point, then steps should be taken to place the responsibility for an accident where it belongs.

The safety committees, in investigating and analyzing the various accidents have always tried to secure all the facts and then place the responsibility in accordance with the facts.

Finally comes the question of discipline. After correct methods have been installed and the employes instructed in these methods, then safety rules and safe practices must be enforced, and employes of the company, irrespective of whether they be foremen, bosses or workmen, who can not or will not show the necessary interest or cooperation should be eliminated from the organization.

The essential points in our educational program are as follows:

(1) Recognition of unsafe practices.

(2) Correction of unsafe practices by studying the job and lining it up in the safest as well as the most efficient way.

(3) Proper instruction to all concerned in these correct and standardized practices.

(4) Sufficient supervision.

(5) Placing responsibility for accidents where it belongs; and

(6) Discipline.

While a number of miscellaneous educational activities were inaugurated, in final analysis the results secured were, to a very large degree, dependent on the program outlined above.

First-Aid and Mine-Rescue Training

MINE-RESCUE training has been available to the employes of the company for many years, and a sufficient number of thoroughly trained mine-rescue men to answer all emergency calls are available.

First-aid instruction has also been available to the employes for many years. Since the year 1930 first-aid training has been compulsory, with the result that the employes of all subsidiary companies are, at the present time, practically 100 percent trained in first-aid methods.

Safety Awards and Safety Bonuses

IN ORDER to stimulate interest a specially designed safety button, on which the name of the department and year the button is issued, are engraved, is issued to employes who work certain periods of time without an accident. Safety buttons of different design are issued for one, two and three year periods. For a five-year period without an accident an engraved belt buckle and belt are awarded.

Safety bonus payments are made to foremen and bosses who complete a calendar month without an accident occurring to the employes under their supervision.

While considerable progress has been made by the various companies of the Phelps Dodge Corporation and the Old Dominion Company, much yet remains to be done before the organization can feel satisfied. Our objective is not simply to reduce the accident rate but to eliminate accidents entirely.

Following is a tabulation of the results secured since the work was reorganized in 1925:

PHELPS DODGE CORPORATION
(Metal Branches)
Old Dominion Company, Copper Queen Branch, Morenci Branch, Moctezuma Copper Co.
Accident Record, Years 1924-1930, Inclusive

Year	No. Lost Time Accidents	Accident Rate Per 1,000 Shifts Worked	Percent Decrease In Accident Rate Under 1924
1924	2,386	1.047	00.0
1925	1,394	.629	39.9
1926	499	.228	78.2
1927	263	.122	88.2
1928	133	.064	93.9
1929	90	.038	96.4
1930	71	.040	96.2

SILVER ACTION BY GOVERNMENT SHELVED IN FAVOR OF DEBT PROPOSAL—SENTIMENT GROWING FOR FORMAL CONFERENCE

With the list of supporters increasing daily for international action looking to the relief of the silver situation, the question appears to be side-tracked temporarily in favor of President Hoover's war-debt reparations proposal. This became known after Senator Smoot, chairman of the Finance Committee, and a group of Utah silver men called upon the President on June 23 for the purpose of outlining a new plan for improving the silver situation, the nature of which was not revealed.

The delegation consisted of W. Mont Ferry, president of the American Silver Producers' Association; J. O. Elton, E. J. Radditz, and George W. Snyder, all of Salt Lake City.

Earlier in the month Senator Smoot revealed that foreign governments were opposed to an international conference, quoting a telegram from the President to him in Salt Lake City which stated: "Informal discussions among nations, some of whose participation is vitally necessary, developed the fact that they do not consider this a proper time to call an international conference on silver and would oppose holding such a conference now."

As an alternative, Senator Smoot suggested that the International Chamber of Commerce call "an unofficial conference at some point in Europe, preferably London."

"This conference," he said, "should consist of world delegates. There is no accomplishment to be made in the stabilization of silver except by cooperation of India, China, British dominions, France, Japan and Italy. Such a conference could recommend plans and methods which governments would take cognizance of for official action."

Senator Key Pittman, chairman of the Senate subcommittee which is making a study of the silver situation, and who was in Shanghai, China, at the time the President's telegram was made public, took exception to Senator Smoot's announcement, stating that about 40 of the world's governments have already indicated that they desire such a conference in an effort to assist the world's suffering commercial interest.

"Therefore," Senator Pittman said, "the conference is assured, and the American Government or any other government, with interests involved, can not afford to stay out of the parley when it convenes. Great Britain and France are probably the principal objectors for reasons peculiar to them, but when the conference opens, rest assured they will be represented.

"The United States Senate, the American National Chamber of Commerce, and other commercial interests say America desires to confer with other nations for mutual betterment.

"The same condition exists in other nations. Therefore President Hoover's telegram in no way indicates a change in our belief that the majority of governments desire such a conference."

Senator Pittman said that President Hoover's telegram to Senator Smoot had been made public at a "critical" moment, when Pittman himself was in Nanking conferring with Chinese nationalist government officials, and with a definite move looming on the part of certain nations for the calling of the proposed formal conference.

As to the feasibility of holding an informal conference on silver, Mr. Pittman stated that this would be but a repetition of the two conferences already held—the United States Chamber of Commerce on the subject, and the similar conference of the International Chamber of Commerce.

"No more representative informal conferences than these could be obtained," he stated. "Both conferences unanimously recommended the calling of a formal conference by governments, such as the London Conference for Limitation of Armaments."

Accompanying Senator Pittman in China were Senators Oddie, Nevada, and Robinson, Indiana, and Representatives Dowell, of Iowa, and Gibson, of Vermont.

Senator King, of Utah, opposed the suggestion of his colleague, Senator Smoot, that the International Chamber of Commerce call an informal silver conference, regardless of the refusal of the governments to participate. Mr. King stated that this movement would "smother the question."

"The United States should lead the way to a solution of the silver question," said King. "It should call the conference immediately. The prestige of the United States would insure a successful issue. Substantially every nation would attend. I regard the depressed value of silver one of the most vital questions in the economic life of the world. Until silver is given a monetary status, the economic situation of the world will be most unsatisfactory."

A demand that the United States "insist, through international agreement, that silver be given its rightful place in economic affairs" was made by Senator William E. Borah in an address before the Southwest Idaho Bar Association at Nampa, Idaho, June 18.

Taking as his text the steady falling off in American foreign trade, he said little could be expected from development of present European markets, but that the great field lay in Russia and China with their 560,000,000 of people.

He said that "an ill-advised, if not selfish, policy with reference to the use of silver in China has reduced the purchasing power of China by one-half within the last few years. In fact, this same policy has not only reduced the purchasing power of China, but it has reduced the purchasing power of nearly one-half of the human family.

"There isn't anything more imperative at this time to the restoration of the purchasing power of China and the oriental countries than the restoration of silver to its rightful place in the monetary world, and from which it was taken by sheer governmental action, destructive and brutal in its effect.

"If we have any initiative, any leadership, left in this country, let us take hold of this problem and insist, through international agreement, that silver be given its rightful place in economic affairs."

In an address before the National Foreign Trade Convention in New York on May 29, George W. Leman, assistant secretary of the Irving Trust Company, urged that the United States purchase

now a supply of silver sufficient to last it 30 years—estimated to be about 200,000,000 ounces, valued at about $70,000,000—to relieve the glut of the world's silver markets.

"We could pay for it," said Mr. Leman, "with about sixty or seventy millions in gold, of which we have such an excessive supply, but which the Indian Government needs so badly to support her new (gold standard) currency scheme.

"In the absence of international agreements regulating silver values, this supply of silver could be employed as a reserve both for our actual currency needs and to prevent too sharp a rise that might later result from a shortage."

No Change in Pig Iron Tariff

The President on June 24 approved the findings of the Tariff Commission which indicates that no change should be made at this time in the duty of $1.12½ per ton on iron in pigs.

This investigation was instituted in response to a Senate resolution. Iron in pigs is used principally to produce various kinds of iron castings and to a smaller extent for the production of steel by small steel works. Approximately 22 percent of the domestic production of all pig iron, amounting to about 8,570,000 tons per year during the period 1927 to 1929, consisted of iron in pigs sold on the open market; the remainder was used principally in a molten condition for the manufacture of steel in the plant where the iron is produced.

The 18-month period January 1, 1929, to June 30, 1930, was selected for purposes of cost comparison.

British India, which since 1926 has supplied about 50 percent of the total imports of iron in pigs from all countries, was found to be the chief competing country.

Imports enter principally at North Atlantic ports and rarely are shipped over 150 miles from the port of importation. The blast furnaces in the Eastern district, largely in Eastern Pennsylvania, in the Buffalo district, and to a lesser extent in the Birmingham, Ala., district constitute the principal source of supply of this consuming market. During the selected cost period Eastern and Buffalo furnaces supplied about 1,200,000 tons to this market as compared to less than 100,000 tons of iron imported from India.

Importations are apparently limited by the commercial considerations of the availability of transportation facilities at low rates, the demand in the United States market for the types of iron usually imported, and the heavy cost in relation to total value of inland transportation in the United States.

At the hearing last October the commission was informed that there were only three "merchant" blast furnaces in operation in the East. "Merchant" plants are those producing pig iron for general sale. The big steel companies make sufficient for their own needs and have not asked additional tariff protection. But lack of protection against competition from British India and elsewhere has worked serious injury to these smaller plants in the East. The inland region is not affected because of the high cost of transporting the product.

Manitoba's Gold Output Increasing Rapidly

More gold was obtained from the mines of Manitoba, Canada, during the first four months of the current year than in the entire year of 1930, according to a report received in the Commerce Department.

Manitoba gold production from January to April, inclusive, amounted to 35,928 ounces, with a value of $739,540, as compared with the total value of $580,000 for the entire 1930 output. If the rate of the first four months is continued, the production for the year 1931 will have a value of approximately $2,500,000, Canadian estimates indicate.

The Hudson Bay Mining and Smelting Company is the chief contributor to the gold production of Manitoba, although the Central Manitoba mines have been stepping up their gold output since the first of the year. Of the first quarter's production approximately $100,000 came from the Central Manitoba. It has been estimated that the by-products gold from the Flin Flon mines is somewhat in excess of $2 a ton of ore mined.

Kirby Thomas Dies

Kirby Thomas, consulting mining engineer of New York, died near Amos, Abitibi, Quebec, on June 22. He had gone there to examine a mining property, and his death was both sudden and unexpected. Mr. Thomas was born at Dodgeville, Wis. He received his mining education at the Wisconsin School of Mines. He was in the newspaper business at one time, being managing editor and then business manager of the *Evening Telegram* at Superior, Wis., and associate editor of *Engineering and Mining Journal* in 1910 and 1911. His professional work as a mining engineer took him to Mexico, South America and Canada, as well as the mining regions of the United States, where he was associated with a number of prominent mining enterprises. He is survived by Mrs. Thomas and a brother.

Bulkeley Wells Dies

Bulkeley Wells, president of the American Mining Congress in 1919 and 1920, and prominently identified with the mining industry of the West, died in San Francisco May 26 from a self-inflicted bullet wound.

Mr. Wells was born at Chicago in 1872. After graduating from Harvard in 1894 he spent 3½ years in mechanical engineering, machine shop and railroad work, and then became treasurer and managing director of the New England Exploration Syndicate. Later he was president and manager of the Smuggler Union and the Ashburton Mining Company and vice president and manager of the Contention Mining Company. In 1925 he was made manager of the Idaho-Mary-

GOLD, SILVER, COPPER, LEAD, AND ZINC IN MONTANA IN 1930

(In terms of recovered or recoverable metal)

Advance figures by C. N. Gerry, of the United States Bureau of Mines, Department of Commerce

County	Number of producers	Ore treated	Gold*	Silver*	Copper	Lead	Zinc	Total value
		Short tons	Fine ounces	Fine ounces	Pounds	Pounds	Pounds	
Beaverhead	7	257	66.81	9,018	6,081	93,884	.....	$10,338
Broadwater	34	828	727.22	9,413	2,317	284,978	1,974	33,302
Cascade	1	355	7.79	8,920	19,090	147,255	4,022	13,633
Deer Lodge	6	275	192.48	149	203	.....	.....	4,062
Fergus	2	1	13.93	20	.....	.....	.....	296
Flathead	1	9,712	16.98	596,344	.....	45,310	.....	232,208
Granite	16	19,986	605.75	371,325	134,195	630,346	3,320,510	363,829
Jefferson	22	11,137	1,047.80	101,475	87,573	1,062,973	967,213	171,687
Judith Basin	3	82,552	562.12	603,317	247,274	9,155,321	6,454,404	1,043,620
Lewis and Clark	30	155,323	14,106.63	16,939	21,798	1,457,180	13,896,250	1,040,845
Lincoln	8	1,864	184.45	8,386	157	80,249	.....	11,074
Madison	61	37,864	11,847.91	50,557	166,153	596,982	19,038	316,745
Meagher	1	.....	2.51	.....	.....	.....	.....	52
Mineral	11	360	75.71	4,590	330	65,198	124,591	12,615
Missoula	10	94	79.14	1,138	8,444	5,317	.....	3,438
Park	5	2	26.27	397	.....	654	.....	729
Phillips	4	44	686.01	214	.....	.....	.....	14,263
Powell	21	106	211.40	2,074	677	26,816	.....	6,598
Ravalli	1	.....	5.76	.....	.....	.....	.....	119
Sanders	3	14,051	48.91	11,042	17,832	2,573,360	85,134	140,334
Silver Bow	18	2,351,836	12,973.59	5,257,545	195,471,941	5,080,221	27,967,972	29,300,169
Stillwater	1	22	.....	26	3,458	.....	.....	460
Total 1930	266	2,686,669	43,489.17	7,052,889	196,187,523	21,306,044	52,841 108	32,720,416†
Total 1929	252	4,723,445	54,758.03	12,716,977	297,725,973	39,213,707	136,351,734	71,779,547‡

* Includes placer production. † Average value of metals: Gold, $20.671835 per ounce; silver, $0.385 per ounce; copper, $0.13 per pound; lead, $0.05 per pound; zinc, $0.048 per pound. ‡ Average value of metals: Gold, $20.671835 per ounce; silver, $0.533 per ounce; copper, $0.176 per pound; lead, $0.063 per pound; zinc, $0.066 per pound.

land mine in California. He was prominently identified with the National Guard in Colorado and retired in 1917 with the rank of brigadier general. During the World War he served in the Military Intelligence Service at Washington.

McDonald Loses Place on Colorado Mining Board

Three vacancies on the board of directors of the State of Colorado Metal Mining Fund were filled recently by Governor Adams with the appointment of John Harvey, of Leadville; H. A. Brown, of Aspen; and Alex McLellan, of Boulder.

Mr. Harvey succeeds Jesse F. McDonald, former governor of Colorado, who has been chairman of the fund board since it was created in 1921. Press reports state that a political feud of long standing is blamed for Governor Adams' action in dropping Mr. McDonald. The news that he had been denied reappointment was met with keen disappointment in mining circles.

Mr. McDonald, as president of the Colorado Metal Mining Association and president of the Colorado Chapter of The American Mining Congress, had the unanimous endorsement of all the leading mining organizations and interests.

The Metal Mining Fund Board, at its organization meeting in June, selected R. M. Henderson, of Breckenridge, as chairman and J. C. Bailey, of Colorado Springs, as vice chairman. C. Lorimer Colburn was reelected secretary.

Eagle-Picher Buys Canan Metals Properties

The Eagle-Picher Mining and Smelting Company bought in the Oklahoma assets of the Canan Metals Corporation sold June 6 by the sheriff of Ottawa County, Oklahoma, at Miami with a bid of $200,000. The assets were sold to satisfy a judgment the Eagle-Picher Company recently obtained against the company and Clement K. Quinn, trustee, for $447,222.81.

Inasmuch as the sale did not bring sufficient money to satisfy the judgment, the Kansas and Missouri assets of the company will have to be sold. A judgment in Missouri has been obtained.

The Canan Company owned the Whitebird, Foch, Golden Hawk, Fort Worth, Southside and Black Hawk mines in Oklahoma. Only two of these, the Whitebird and Golden Hawk, have been operated recently.

The properties will be consolidated with the other properties of the Eagle-Picher Company and probably eventually will be worked over the large central mill for which the company now is drawing plans.

American Zinc Institute Adopts "Seal of Quality"

A "Seal of Quality," to be stenciled on galvanized sheets carrying specified weights of zinc coating, has been adopted by the American Zinc Institute. This seal will be used by manufacturers of galvanized sheets under a license arrangement, to indicate sheets of certified quality.

Extensive studies by the Zinc Institute and various technical organizations have shown that the dominant factor in determining the service of a galvanized sheet, from the standpoint of continued freedom from rust, is the thickness or weight of the zinc coating. This is customarily expressed in ounces per square foot, meaning thereby the total amount

of zinc on both sides of the sheet; for instance, a 2-ounce coating means approximately one ounce per square foot on each side. A relatively small increase in the coating will result in a very substantial increase in life and service.

Because of the variation in the zinc coatings on commercial galvanized sheets today, and the lack of any means whereby the consumer may identify an adequately coated product, the "Zinc Institute Seal of Quality" has been suggested by both producing and consuming interests. Sheets bearing this seal will carry weights of zinc coating which were decided upon after careful field studies as being most suitable for the service desired.

For use in rural communities, particularly for roofing and siding of farm buildings, such sheets will be produced in No. 28 and No. 26 gauge, with a coating of 1.75 ounces of zinc per square foot. This coating is fully 40 to 100 percent heavier than coatings on most of the commercial sheets produced today, and will preserve the sheets from rust for a far longer period than the thinner coatings. For use in localities where atmospheric conditions are more severe, sheets of 26 gauge and heavier, carrying 2.00 to 2.50 ounces of zinc per square foot, will be produced.

Application has been filed by the Zinc Institute with the U. S. Patent Office for registration of the Seal, and its use will be limited to sheets produced under license, subject to careful checking as to the standard of zinc coating. The matter has been submitted to all of the manufacturers of galvanized sheets and license arrangements, without charge, are now being concluded with a number of the manufacturers. Every sheet produced under this arrangement will be stenciled with the "Seal of Quality" and the weight of zinc coating, and also with the manufacturer's own name or trademark.

As a further means of assisting those interested in galvanized materials, the Zinc Institute has begun a program of educational work, designed to inform both consumers and dealers as to the differences in zinc coatings and means of obtaining products which will give superior service. In this work particular attention will be devoted to the rural field, in which galvanized products are widely used and in which there is practically no understanding of the factors which constitute quality.

This general subject was discussed by G. C. Bartells, technical assistant of the Institute, at a meeting of the American Society of Agricultural Engineers at Ames, Iowa, on June 23d. Great interest was shown by those in attendance, representing university extension departments and farm bureaus from many parts of the country, who reported a pressing need for this type of information.

In connection with its program, the Zinc Institute has also appointed Charles Matthews as field representative in certain of the midwestern states. Mr. Matthews has been sales extension representative of the fertilizer department of the Anaconda Copper Mining Company, and previously was associated with the U. S. Department of Agriculture and the extension department of the University of Minnesota.

Chile Government Takes Control of Gold Mines

To prevent wildcat speculation and encourage legitimate investment in such worth-while gold properties as may exist within the country, the Government of Chile recently enacted a decree with force of law which would close to private entities those gold-producing regions which offer prospects of successful working, pending a careful survey by Government mining engineers, according to a report received by the Commerce Department. When such survey discloses that the deposits are capable of being exploited on a commercial scale, the President is authorized to reserve them for the State or to grant concessions to private enterprises which are in position to work them.

Gold, Silver, Copper, Lead, and Zinc in the Eastern States in 1930

The mines in the Eastern states yielded metals in 1930 valued as follows: Gold, $46,637; silver, $47,582; copper, $4,970,164; lead, $836,700; and zinc, $18,126,878, according to the Bureau of Mines. There were increases in the quantity of all five metals, but decreases in the value of the silver, copper, and zinc, compared with 1929. The producing mines reporting in 1930 were 7 placers and 17 lode mines.

The value of the gold increased from $36,793 in 1929 to $46,637 in 1930. The placer gold reported amounted to $1,686 and was derived from seven small operations in Alabama, Georgia, and North Carolina. Placer mines in North Carolina yielded $994. Lode mines operating in the Eastern states in 1930 yielded $44,951 in gold, of which $3,952 was from Georgia, $13,588 from North Carolina, $13,023 from Pennsylvania, and $14,388 from Tennessee. Dry and siliceous ore milled in Georgia and North Carolina yielded a recovery of $6,740 in gold; copper ore from North Carolina and Tennessee yielded $25,188; and the pyritiferous magnetite ore from Pennsylvania yielded $13,023. The gold recovered from base ores in 1930 was about seven times as much as that derived from placers and lode gold ore.

The total production of silver was 123,590 ounces, of which 10 ounces was from placer bullion, 70 ounces from siliceous ore, 117,748 ounces from copper ore mined in Tennessee, North Carolina, and Vermont, and 5,762 ounces from copper concentrates shipped from Pennsylvania.

The mine production of copper increased from 34,045,920 pounds in 1929 to 38,232,031 pounds in 1930. The production of copper in 1930 came from the Fontana and Cullowhee mines in North Carolina, the properties of the Ducktown Chemical & Iron Co., and the Tennessee Copper Co., in Tennessee, the Cornwall mines in Pennsylvania, and the property of the National Copper Corporation in Vermont.

The lead shipped in 1930 was from the Austinville mine of the Bertha Mineral Co., in Virginia, the Balmat mine of the St. Joseph Lead Co., in New York and the properties of the Embree Iron Co., in Tennessee. The output was much larger in 1930 than in 1929.

The mine production of zinc in the Eastern states increased from 309,096,000 pounds in 1929 to 336,488,000 pounds in 1930. The New Jersey Zinc Co.'s mines in New Jersey were the largest producers, but the increase in 1930 was due to operations at the Austinville mine in Virginia, the Universal Exploration Co. property in Tennessee, and particularly to the opening of the Balmat mine of the St. Joseph Lead Co., in St. Lawrence County, New York.

The total quantity of zinc ore mined and milled in the Eastern states in 1930 was 1,613,313 tons, that of copper ore 915,358 tons, and that of pyritiferous magnetite ore (which yielded 6,121 tons of copper concentrates) 1,001,324 tons. There was a large quantity of lead-zinc ore milled and only about 900 tons of siliceous ore.

Mining Methods and Costs at Metal Mines Summarized

Mining methods and costs in the metal mines of this country are discussed in Information Circular 6503, United States Bureau of Mines. In this circular, Charles W. Wright has summarized certain of the pertinent data growing out of a study of mining methods and costs undertaken some three years ago and continued up to the present writing. This precedes a mere detailed and intensive study of the mining problems presented in the series of papers here summarized.

Only about 400 of the metal mines in the United States produced a value of more than $100,000 each in 1929, and it is with these mines that the paper deals.

The mining methods in use at these mines have been classified, briefly described and discussed with reference to their applicability to various conditions, types of ore bodies and character of mineralization. The different methods of mining are illustrated to show typical practice and principal variations therefrom. The inherent advantages and disadvantages of each method are briefly summarized and the factors to be considered when selecting a mining method for a given ore deposit are discussed.

Of particular interest from the economic standpoint are the tabulations of data showing: Tonnages produced as classified according to mining method; average results of each mining method, classified according to metallic mineral mined in units of labor per ton of ore mined; dollar costs for different mining methods and costs for each method in units of labor, power, explosives, timber and other supplies.

A table presents summarized accident data from over 400 mines for the year 1929, by mining methods, a form in which these data have never before been presented.

In the closing paragraphs, Mr. Wright has briefly discussed recent progress in mining practice and pointed out the present tendency toward improvements.

Finally a bibliography is given in which are listed, according to principal stoping methods, Bureau of Mines Information Circulars dealing with mining practice.

Copies of Information Circular 6503 may be obtained from the United States Bureau of Mines, Washington, D. C.

Premium Prices in Australia for New Zealand Gold

Premiums on gold, offered by Australia as an inducement to the importation of gold bullion which she needs to bolster up her exchange situation, are bringing increased profits to the gold mining companies of the neighboring country of New Zealand, according to information received by the Commerce Department. The premium paid on the gold raises the return to the New Zealand mines from the standard price of $18.87 per ounce to $22.74.

GOLD, SILVER, COPPER, LEAD, AND ZINC IN NEVADA IN 1930

(In terms of recovered or recoverable metal)

Advance figures by Victor C. Heikes, of the United States Bureau of Mines, Department of Commerce

County	Mines producing	Ore treated	Gold*	Silver*	Copper	Lead	Zinc	Total value
		Short tons	Fine ounces	Fine ounces				
Churchill	3	1,047	39.09	3,327	55	30,348	.....	$3,613
Clark	16	10,458	1,368.77	6,565	18,346	966,686	2,474,323	200,309
Elko	29	63,355	22,711.38	290,614	157,323	1,298,985	.....	666,773
Esmeralda	27	380,236	31,564.64	1,433,961	19,287	4,570	.....	1,207,310
Eureka	6	3,521	806.31	61,465	10,784	402,977	.....	61,883
Humboldt	6	294	145.85	199	5,855	1,900	.....	3,947
Lander	33	9,752	1,735.36	31,426	1,316,572	33,740	.....	220,813
Lincoln	5	119,907	1,822.72	843,574	1,995,571	12,738,686	22,171,629	2,323,051
Lyon	15	4,714	1,055.06	11,651	233,766	886	.....	56,730
Mineral	15	1,584	1,141.70	5,307	6,538	4,100	.....	26,699
Nye	52	128,385	21,591.89	1,139,782	2,502	7,246,112	4,522,165	1,464,855
Ormsby	2	2	4.45	2	.....	.....	.....	93
Pershing	16	15,778	10,908.47	24,514	33,357	36,032	.....	241,075
Storey	14	6,198	2,435.79	25,296	.....	.....	.....	60,091
Washoe	11	322	353.18	651	3,430	.....	.....	7,998
White Pine	30	4,011,625	51,379.81	341,498	105,400,126	293,359	.....	14,910,277
Total 1930	280	4,757,178	149,064.47	4,219,832	109,203,512	23,058,381	29,168,117	21,455,517†
Total 1929	338	7,355,500	163,711.22	4,923,526	140,138,809	19,682,568	16,920,083	33,030,237‡

* Includes placer production. † Average value of metals: Gold, $20.671835 per ounce; silver, $0.385 per ounce; copper, $0.13 per pound; lead, $0.05 per pound; zinc, $0.048 per pound. ‡ Average value of metals: Gold, $20.671835 per ounce; silver, $0.533 per ounce; copper, $0.176 per pound; lead, $0.063 per pound; zinc, $0.066 per pound.

A. C. Fieldner Honored

A. C. Fieldner, chief engineer, Experiment Stations Division, United States Bureau of Mines, Washington, D. C., was awarded the Lamme Meritorious Achievement Medal by the Ohio State University on June 8. This gold medal, awarded annually to a graduate of one of the departments of the university for meritorious achievement in engineering or the technical arts, was established by the will of the late Benjamin G. Lamme, of the engineering department of the Westinghouse Electric and Manufacturing Company. Mr. Fieldner is a member of the first class in chemical engineering graduated from Ohio State University and is one of the first two recipients of the Lamme Medal.

Import Ban on Russian Products to be Decided Soon

Whether or not all Russian products are the result of forced or indentured labor, and therefore prohibited to entry into this country after January 1, 1932, is expected to be decided by the Customs Division of the Treasury Department shortly. On January 1 next, that provision in the tariff act of 1930, extending the import ban against convict-made goods to foreign articles produced by forced or indentured labor, becomes effective.

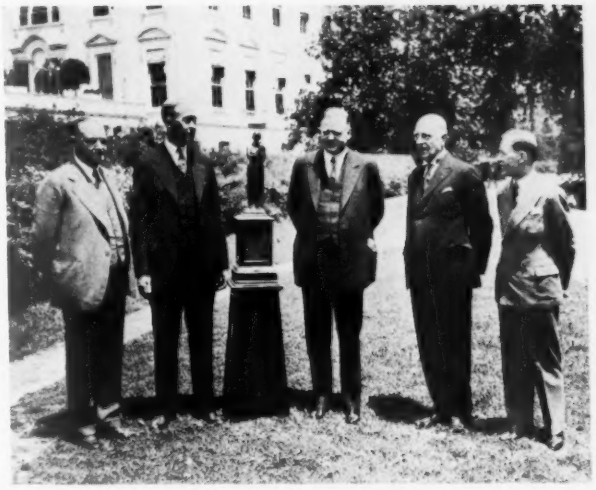
It is contended by some officials in the Customs Service that Russia has no free labor, and the requirement that a man must work to secure a food ticket puts his labor in the forced class.

Strong recommendations will likely be made to place all Russian commerce under the ban by those interests whose products suffer from competition by Russian "dumping" and whose representatives in Congress at the last session sought such a blanket embargo by direct act of Congress, particularly oil, lumber, pulpwood, manganese and coal.

On the other hand, the groups which sell to the Soviet will oppose any such drastic action. Russian commercial representatives in this country, headed by the Amtorg Trading Corporation, would also make a stiff fight against any interpretation of the law which would shut out Russian products.

Drop Forging Survey

Questionnaires are being mailed to manufacturers of drop forgings by the Commerce Department for the purpose of determining the production facilities and equipment of the industry, and the extent to which these facilities have been employed in supplying the demand for forging products in recent years. The survey will deal with all manufacturers of drop forgings, and manufacturers who sell all or a substantial part of their total output as rough forgings. One object of the survey will be to determine the total production capacity of the industry in terms of maximum tonnage, the total annual actual production of rough forgings from 1925 to 1930, and the aggregate investment in drop forging production from 1928 to 1930. The survey will also aim to show the relative importance of the different types of forgings produced. A census of equipment will be taken, showing the total count of both hammers and upsetters of various types in use in all plants together with the amount of change in equipment during the period covered by the study.



The winners of the National Safety Competition with President Hoover in Washington, June 8, when the latter presented the awards. Left to right: W. P. Chinn, general manager of Pickands-Mather & Company; A. B. Jessup, vice president of Coxe Brothers & Company, Inc.; President Hoover; J. H. Shearer, president of the Penn Central Light & Power Company; and Theodore Marvin, editor of "The Explosives Engineer."

Mr. Chinn represented the West Vulcan Mine, Vulcan, Mich., of the Penn Iron Mining Company, winner in the metal group, and the Plymouth Mine, Wakefield, Mich., of the Plymouth Mining Company, winner in the open pit group, both of them Pickands-Mather subsidiaries. Mr. Jessup received the award for the Tomhicken Mine at Jeddo, Pa., winner in the anthracite group; and Mr. Shearer for the Penn Central Mine No. 1, near Coalmont, Pa., winner in the bituminous group.

Mercury Output Lower in 1930

The domestic output of mercury in 1930 amounted to 21,553 flasks, valued at $2,478,789, a decline of 9 percent in quantity and 14 percent in value as compared with 23,682 flasks, valued at $2,892,638, in 1929, according to the Bureau of Mines. The average quoted price at New York was 6 percent below that in 1929. Apparent consumption declined 35 percent, and this drop in consumption severely affected the consumption of imported mercury which decreased from 14,917 flasks in 1929 to 3,725 flasks in 1930, a decrease of 75 percent.

By a wide margin California was again the leading mercury-producing state in 1930, with an output of 11,451 flasks. California and Texas were the only important producing states to increase their output. The production in California in 1930 was made by 40 operators while in 1929 the output of 10,139 flasks was made by 29 operators. Nevada's output declined 31 percent in 1930, from 4,764 flasks in 1929 to 3,282 flasks, but it was large enough to again place Nevada second in importance among the mercury-producing states. As in 1929 Oregon ranked third in 1930 with an output of 2,919 flasks compared with 3,657 flasks in 1929. The output of Texas showed an increase in 1930 while production in Arizona decreased sharply. Production for Texas, Arizona and Alaska amounted to 2,822 flasks in 1930 as compared with 3,725 flasks in 1929. No mercury was reported as produced from the treatment of pan-amalgamation tailings in 1930.

The principal mercury-producing mines in 1930 were the Cuddeback mine, Kern County, Sulphur Bank and Red Elephant mines, Lake County, La Joya, Oat Hill, Bella Oak and Knoxville mines, Napa County, New Idria mine, San Benito County, Oceanic and Rinconada mines, San Luis Obispo County, Cloverdale mine, Sonoma County, and Altoona mine, Trinity County, in California; the B. & B. and Red Rock properties, Esmeralda County, Sentinel mine, Nye County, the Juniper and Montgomery and Pershing mines, Pershing County,

and Castle Peak mine, Storey County, in Nevada; the Black Butte mine, Lane County, and the Opalite mine, Malheur County, in Oregon; the Big Bend, Chisos, and Rainbow mines, Brewster County, Texas; and the mine of the Morton Cinnabar Co., Lewis County, Washington.

In 1930 general imports of mercury were 2,943 flasks, valued at $295,829, as compared with 14,292 flasks, valued at $1,447,142, in 1929. Of the total in 1930, 2,802 flasks were reported as received from Spain and 141 flasks from Mexico. The 14,292 flasks imported in 1929 were credited to the following countries: Spain 9,412 flasks; Belgium 1,249 flasks, Mexico 1,209 flasks, Italy 892 flasks, Germany 701 flasks, Canada 493 flasks, France 323 flasks and Peru 13 flasks.

Production in the United States plus imports for consumption and with allowances for exports, which have not been separately recorded since 1926, indicate that 25,200 flasks were made available for consumption in 1930 as compared with 38,500 flasks in 1929.

Lyon Leaves Bureau of Mines

Dr. Dorsey A. Lyon, supervising engineer of the Intermountain Station of the United States Bureau of Mines located at the University of Utah, has resigned his position with the Bureau, to give his entire time to his duties as director of the Utah Engineering Experiment Station of the University. Dr. Lyon has been with the Bureau for nearly 20 years.

Cooperative work between the Bureau and the University was inaugurated by him in 1914. In 1917 he was transferred to Washington, and subsequently became supervisor of all of the Bureau's mining experiment stations; he was also chief metallurgist of the Bureau from 1919 to 1927 and assistant director from 1923 to 1926. On July 1, 1927, he resigned all of the positions he then held with the Bureau in order to return to Utah. At that time the cooperative agreement was entered into between the Bureau and the University whereby Dr. Lyon would act jointly for the Bureau and the University, as head of the Bureau's station, and director of the Utah Engineering Experiment Station, giving especial attention to the Department of Mining and Metallurgical Research.

"The work of the Experiment Station has grown, and the work of the University and the Bureau, especially as pertains to metallurgical research, has attracted attention not only of the mining industry locally, but also throughout the world," said President Thomas.

"The University, therefore," concluded President Thomas, "considers itself particularly fortunate that Dr. Lyon, with his long experience in research and educational work, will now be able to devote his whole attention to the carrying out of the University's program for service to the mineral industry."

Minnesota Ore Drop Lessens Tax

Iron mining companies in Minnesota this year will pay $1,130,000 less in state taxes than last year, the State Tax Commission announces. The decrease is accounted for largely by the decrease in ore mined last year as compared with 1929. The companies are required to pay a 6 percent occupation tax on the ore they take from the ground. In 1930, a total of 35,000,000 tons of iron were taken from the Minnesota mines against 45,000,000 in 1929.

Nelson Franklin Dies

Nelson Franklin, well-known mining engineer of Washington, D. C., died at his home on June 14 from a heart attack, which he suffered while attending

a ball game the day before. He was 77 years of age.

Mr. Franklin was first identified with the mining industry as a prospector in the early days of Colorado. He subsequently acquired interests in some of the leading gold mines of Colorado, and at one time operated the Blue Bird mine in the Cripple Creek District. Although best known as a mining engineer, Mr. Franklin was credited with many achievements in other lines of endeavor, among them the construction of the first street car line in Denver.

In more recent years, Mr. Franklin had been an ardent sportsman. Since 1924 he has attended every baseball game played by the Washington Club at home. His box at the ball park was the rendezvous of many of his friends, among them being Senators Watson, of Indiana; Tydings, of Maryland; and Harrison, of Mississippi.

He is survived by his widow, a son and a daughter.

Higher Iron Rate Refused Railroads

The Interstate Commerce Commission refused to permit railroads to increase rates on iron and steel products from Birmingham and other southern points to eastern New England and Buffalo-Pittsburgh territories.

The southern rates are lower than the rest of the country. The railroads sought to increase them to the level of other sections.

"It is undeniably true as here contended," said the commission, "that the present rates from the South to the North are a result of market competition, but that fact in itself is no proof that such rates may be lawfuly increased and more particularly by abrupt increases such as here proposed, which would do serious violence to a legitimate business long fostered by the respondents.

"The evidence upon this record leaves no doubt that the southern manufacturers would have serious, if not insurmountable, difficulty in competing with northern manufacturers in the destination territory if the proposed rates became effective.

"Since the demand in southern territory for the articles manufactured by them is much less than they can supply, it must be that if their market in the North were thus seriously restricted the very existence of some of these southern manufacturers would be threatened. The burden of proving the lawfulness of the proposed rates is upon respondents, and we are of the opinion that they have not sustained it."

Mine Employment Decreases

The mining industry suffered decreases in employment during May as compared with April, according to a report of the Department of Labor. There was a 5.7 percent reduction in anthracite mining, 4.1 percent in bituminous, 2.9 percent in crude petroleum, 2.4 percent in metal mining and 1.5 percent in non-metallic mining.

Frank B. Wadleigh, mining engineer, of Washington, D. C., has left for a summer's work in Alaska as consulting engineer of the Department of the Interior. He is to investigate the coal and transportation resources of the Matanuska district and make recommendations with reference to their further development.

ANOTHER LAKE CARGO COAL RATE DECISION HANGS IN THE BALANCE

The fourth Lake Cargo coal rate controversy in 19 years is before the Interstate Commerce Commission for settlement.

With the freight rate differential on coal to the Great Lakes from the northern and southern bituminous regions woven into the general rail rate structure, Commission officials said every effort would be made to reach a decision before hearings are begun on the proposed general increase in all freight rates.

Arguments on the present differential case have been concluded before the Commission.

Parties to this latest chaper of the Lake Cargo coal rate controversy recently filed briefs with the Interstate Commerce Commission in regard to the recommendation of Examiner Bardwell that the case be dismissed. The Western Pennsylvania Coal Traffic Bureau, one of the complainants in the case, which sought a widening of the present differentials, challenged the right of the commission to prescribe a rate differential between Pennsylvania and Ohio and Southern mines. A brief filed by the bureau with the commission asked a reversal of the examiner's report. Claiming the examiner's finding was contrary to the evidence, the brief contended that coal shippers in the Pittsburgh area were entitled to a rate 35 cents a ton under that from Fairmont, W. Va., 80 cents below districts now paying a rate of $1.81 and 95 cents under those paying $1.96.

Southern railroads and coal operators supported the recommendation of Examiner Bardwell and asked that the case be dismissed. The railroad's brief stated that "the evidence clearly justifies the present differential relationship and the law clearly furnishes no basis for a contrary finding."

Intervening operators in southern West Virginia, Tennessee, Kentucky, and Virginia also endorse the proposed decision. They state: "The evidence shows that the existing differentials of 35 and 38 cents on high volatile coal and of 50 and 53 cents on low volatile coal against the southern districts, the largest in the history of the lake coal trade, are more than adequate to compensate the carriers for the longer haul from the southern districts than from the northern districts to Lake Erie ports."

The Fairmont Coal Traffic Bureau urges the commission to approve the findings of Examiner Bardwell, declaring that in reality Fairmont stood between the northern or complaining districts and the districts in southern West Virginia, Kentucky, Tennessee and Virginia and could not be "treated fairly by considering it generally as one of the alleged preferred or southern districts." Such generalization, its brief said, would result in great injustice to Fairmont if the rate spread between the complaining districts is increased. The brief pointed out differences in rates in connection with the case and said tonnage figures demonstrated that Fairmont was losing tonnage to the complaining districts.

Approval of the examiner's recommendation by the commission would mean a victory for the southern mines and leave the rates stand as they are. The basic rates are $1.46 per net ton from Pittsburgh and $1.81 from the high volatile southern districts. The commission includes the Fairmont, Kanawha, Thacker, Kentucky, Big Sandy, Hazard, McRoberts, Harlan and South Jellico districts as the high volatile districts. The rate from the low volatile districts is $1.96. The low volatile districts are made up of the New River, Pocahontas, Tug River, Clinch Valley No. 1, Clinch Valley No. 2, Stonega, and Oakdale districts. The basic differentials are therefore 35 and 50 cents. Eastern Ohio and western Pennsylvania mines, through the Ohio Lake Cargo Rate Committee and the Western Pennsylvania Coal Traffic Bureau, with numerous intervenors, sought to have this 35-cent differential increased to 45 cents.

Coal Credit Corporation Outlines Future Activities

The Executive Committee of the National Coal Credit Corporation, organized in April for the purpose of gathering and disseminating credit and related information with respect to the coal industry, met at Cincinnati, on June 18, for the purpose of outlining the future activities of the corporation. President W. J. McGee presided at an all-day session.

Plans for increasing the membership of the organization were considered. There was a thorough discussion of the question of the organization of a Collection Department to be operated in conjunction with the corporation, a plan of which will be submitted and acted upon at a later meeting of the Executive Committee, to be held in Cincinnati June 26.

The committee announced the engagement of the services of M. W. Stark, formerly vice president of the Red Jacket Consolidated Coal & Coke Company, to cooperate with the secretary in getting the work of the new corporation under way.

Officers and directors for the corporation were elected at a meeting held June 11. The officers are: President, W. J. McGee, Cincinnati, vice president of the Carbon Fuel Company; vice president, E. H. Jaynes, Cleveland, assistant secretary of The Cleveland-Cliffs Iron Company; treasurer, L. C. Percival, Cincinnati, general manager of sales, Island Creek Coal Company; executive secretary, Forrest C. Respess; and counsel, Stuart Ducker.

Members of the Executive Committee attending the June 18 meeting were: Harry Gardner, Koppers Coal Company, Inc., Pittsburgh; Calvin Holmes, president, Holmes-Darst Coal Co., Knoxville; Fred Legg, president, Logan & Kanawha Coal Company, Cincinnati; J. W. Mayhew, assistant to president, Red Jacket Cons. Coal & Coke Company, Columbus; Ray L. Phelps, secretary-treasurer, Lorain Coal & Dock Company, Columbus; President McGee, and Messrs. Percival, Respess, Ducker and Stark.

Court Holds Labor Contract Bill to Be Invalid

In an opinion just handed down by the Massachusetts Supreme Judicial Court, it was held that a bill proposed in the state legislature to declare individual employment contracts against the public policy of the commonwealth would be unconstitutional if enacted into a law. The bill also sought to deprive courts of the power to issue injunctions touching such contracts. Citing cases, the opinion states that the Supreme Court of the United States has held that similar Federal and state statutes are violative of the provisions of the Federal Constitution forbidding the enactment of any law depriving a person of the right of freedom in making contracts. A further provision with respect to procedure in labor disputes was held to be class legislation and to impair equality before the law and equal protection of equal laws to all persons.

Anthracite Tax Eliminated

Efforts are being made by the State Department of Revenue to close its accounts with the anthracite mining companies which since 1921 have been paying a state tax on all coal mined for the market.

The anthracite tax was eliminated with the close of the last state fiscal period, May 31, when under the provisions of the act of 1929, the tax was one-half of 1 percent.

The tax under the act of 1921 was 1½ percent per ton, but the act of 1929 reduced this to 1 percent, commencing June 1, 1929. At the expiration of that fiscal period, the tax was reduced to one-half of 1 percent, the reduction being effective June 1, 1930.

Standards Proposed for Prepared Bituminous Coal

There is a movement before the American Standards Association to organize a Sectional Committee looking toward the establishment of "Standards for Prepared Bituminous Coal." The scope proposed for this project is as follows:

> "Specifications outlining allowable limits of extraneous foreign matter in any size of prepared bituminous coal; the minimum size to be covered by standards; the minimum amount of under-size and over-size allowable in each mine."

Such a committee would be composed of all of the national associations having an interest in the development, and it has been proposed that the manufacturers of coal preparation equipment would act through The American Mining Congress.

Howard N. Eavenson, chairman of the Coal Division of the American Institute of Mining and Metallurgical Engineers, has written the American Standards Association as follows in regard to the desirability of setting up such standards:

> "For some time discussion has been going on in the bituminous coal business about the meaning of 'clean' coal. Most coal mined and shipped has had no preparation other than casual inspection and separation of the larger impurities in the mine by the loader; a large percentage, in addition to this, has the coal screened at the tipple and certain parts of it spread on picking tables and cleaned by hand; a smaller, but rapidly increasing, percentage is being cleaned by mechanical processes, either wet or dry, this treatment usually being of the sizes not cleaned by hand, although sometimes all of it is mechanically cleaned.
>
> "When coal thus treated is sold it is all sold as 'clean' coal, while in some sizes of some coals there may be 0.5 percent of pieces of impurities, while others may contain 4 percent. The smaller amount may be the absolute minimum which it is possible to reach while the larger one depends upon the methods and management used. The amounts of impurities necessarily present will vary with the sizes of coal, being usually greater in the smaller sizes.
>
> "It is obvious that the mine shipping 'clean' coal on the minimum impurity basis is handicapped in competing with one shipping a larger amount, although both products may have been cleaned. In these days of price competition all of these items count, and an agreed-upon basis will be of help not only to the shipper, but also to the consumer, who will then for the first time know what he may expect when he buys 'clean' coal and will have a standard by which he can measure it."

The question of initiation of this work will be submitted to the American Standards Association Standards Council at an early date and, if approved by the Council, a technical committee will be organized and the work undertaken.

Research Bureau Created in Pennsylvania Mines Department

A bureau of research to promote the welfare of the mining and mineral interests of Pennsylvania is created in the State Department of Mines by the administrative code approved by Governor Pinchot June 9. That part of the code relating to the Mines Department directs it through a separate bureau "to take such steps as it may deem advisable to promote the welfare of the mining and mineral interests for the Commonwealth and the use of the mineral products of Pennsylvania. The exercise of this function shall not in any way interfere with the safety work of the Department."

Safety Code for Coal Mine Transportation Adopted

The American Mining Congress National Standardization Division, Coal Mining Branch, has just completed a new safety code for coal mine transportation. Approval by the American Standards Association was given June 24 and the project officially designated as American Recommended Practice. The standard consists of two parts:

Part I, *Installation*, covers tracks, their material and workmanship, bonding, stop blocks and derails on grades, switches, derailers on slopes and safety blocks; clearances in working places, entries, slopes and by-passes are specified; signal systems governing the various classes of haulage are recommended; complete safety specifications covering the installation of slope and shaft hoists are given as well as safety features for bumpers, brakes, couplings and bodies of mine cars.

Part II, *Operation*, covers safety requirements in the use of transportation equipment, gathering, rope haulageways in shafts and slopes, locomotives, man trips, hauling explosives and proper inspection and placement of inspection records. The Sectional Committee responsible for the development of these recommendations is as follows:

American Association for Labor Legislation, John B. Andrews, secretary.

American Institute of Mining and Metallurgical Engineers, A. W. Hesse, chief mining engineer, Buckeye Coal Co.

American Mining Congress, Fred Norman (chairman of the committee), chief engineer, Allegheny River Mining Co., and C. E. Watts, mechanical engineer, Berwind-White Coal Mining Co.

Coal Mining Institute of America, A. R. Pollock, general manager of mines, Ford Collieries Co.

National Coal Association, Ezra Van Horn, general manager, Clarkson Coal Mining Co.

National Electrical Manufacturers' Association, J. H. Flory, Jeffrey Manufacturing Company; C. T. Miles, General Electric Co.; and D. E. Renshaw, general engineer, Westinghouse Elec. & Mfg. Co.

National Safety Council, J. D. Martin, assistant mining director, Philadelphia & Reading Coal & Iron Co.

Rocky Mountain Coal Mining Institute, F. W. Whiteside, chief engineer, Victor-American Fuel Co.

U. S. Bureau of Mines, Rudolf Kudlich, Washington, D. C., and L. C. Ilsley, Pittsburgh, Pa.

U. S. Department of Labor, F. P. Hanaway, Pittsburgh, Pa.

Safety Institute in Every Field Proposed

Plans to promote interest in safety throughout the coal mining fields of the country were discussed by a subcommittee of the Safety Committee of the National Coal Association, held June 9 in Washington, and attended by J. Wm. Wetter, Phillipsburg, Pa., general manager, Madeira Hill Coal Mining Co. (chairman); George Dunglinson, Jr., Bluefield, W. Va., manager, fuel department, Norfolk & Western Railway Co.; Lee Long, Dante, Va., vice president, Clinchfield Coal Corp.; Howard Willets, New York, vice president, Alamo Coal Co. (Colorado); and John C. Kennedy, safety engineer of the National Coal Association.

Progress in the safety work in Ohio was detailed by Mr. Kennedy, who has conferred with operators in that state, where he will organize two or more safety institutes. Each member of the committee offered his cooperation in the matter of organizing safety institutes in his respective field. It is the hope of the committee that, within a year, there will be a safety institute, similar to those of the Southern Appalachian and Harlan districts, in operation in every producing field.

J. J. Lincoln Heads Pocahontas Operators' Association

At the annual meeting of the Pocahontas Operators' Association held early in June in Washington, D. C., John J. Lincoln, vice president, Crozer Coal & Coke Company, Elkhorn, W. Va., was chosen president. Col. James Ellwood Jones, first vice president, Pocahontas Fuel Company, Switchback, W. Va., was reelected vice president; and Morris Watts, general manager, Arlington Coal & Coke Company, Bluefield, W. Va., treasurer, succeeding Mr. Lincoln. W. E. E. Koepler, who has filled the position for many years to the great satisfaction of the members of the organization, was reelected secretary. The meeting was largely attended and virtually all companies affiliated with the association were represented.

CONFERENCE OF COAL OPERATORS CALLED BY GOVERNMENT—U. M. W. GAINING RECOGNITION

A conference of bituminous coal operators has been called by Secretary of Commerce Lamont, to meet in Washington on July 9 for the purpose of discussing the present situation in the industry and arriving at some definite measures for stabilization. This action by the Federal Government was taken after several weeks of labor difficulties and uprisings in various districts, and follows a request made to President Hoover by John L. Lewis, president of the United Mine Workers, for a joint meeting of miners' representatives and operators for the purpose of "finding a common basic understanding."

The meeting will be a preliminary one to find ways and means of bringing all elements in the coal industry together on points of dispute. Secretary Lamont sent invitation to 25 leading coal operators asking them to attend. If the result is favorable, the Administration hopes to get both operators and miners together at a subsequent meeting.

The latest disturbances in the coal fields, particularly in the Pittsburgh district, are attributed by well-informed observers to the National Miners' Union, left-wing off-shoot of the United Mine Workers, formed several years ago by mal-contents in the older union. Its ring leaders are William Z. Foster and Frank Borich, both said to be avowed Communists. Estimates of the strength of this organization vary. It has succeeded, however, in gathering several thousand mine workers into its fold, almost entirely in the western Pennsylvania, eastern Ohio and northern West Virginia districts, and has forced suspensions at a number of properties and caused considerable disturbance at others with its picketing and rioting activities.

Testimony in a suit brought by the Butler Consolidated Coal Company for an injunction restraining the National Miners' Union from interfering with employes at the company's Wildwood Mine, Butler, Pa., brought out the fact that the dual union is affiliated with the "Red Internationale of Labor Unions." Over objections of attorneys for the union the preamble of the National Miners' Union constitution was read as follows:

"The constitution declares that the interests of the employers and those of the workers have nothing in common, but are diametrically opposed to one another. . . . Our organization shall ever remain truly class-conscious. This organization shall affiliate itself with the class-conscious labor movement of the world and declares adherence to the program, principles and status of the Red Internationale of Labor Unions."

The injunction was granted, but was ignored several days later when a group of the union's picketers marched on the mine and started a fight which resulted in the death of one of their number and injury to a dozen others.

The National Miners' Union served notice that it would establish a picket line in Washington when the conference gets under way. The statement read, in part:

"We shall not stand for any attempt of the United Mine Workers to claim to represent the miners in this conference. We will picket the conference with every miner and miner's wife and child who can get to Washington. We will take advantage of this opportunity to collect relief for our strikers on the streets and in the homes of Washington."

The statement attacked the proposed conference as a "strike-breaking" effort intended to transform the soft coal field into a "Fascist camp in which the miners take more wage cuts."

Pittsburgh Terminal Company Signs Agreement with Union

Mines of the Pittsburgh Terminal Coal Corporation, second largest coal producer in the Pittsburgh area and one of the largest in the country, opened June 23, with union miners for the first time since 1927, under an agreement for an eight-hour day, general wage increases and some degree of union control, reached by officials of the company and United Mine Workers of America.

Announcing the agreement, Philip Murray, international vice president of the United Mine Workers, said: "We do not propose to tolerate undue interference on the part of Communistic elements in putting the wage agreement into operation."

The Pittsburgh Terminal Coal Corporation operates five mines in the district. Its annual production normally is about 4,500,000 tons.

Mines affected by the agreement are Castle Shannon No. 2, Mollenauer No. 3, Horning No. 4, Coverdale No. 8 and Avella No. 9. United Mine Workers' officials claimed complete organization of the Avella and Castle Shannon workings.

Northern West Virginia Companies Recognize U. M. W.

Officials of the United Mine Workers have been able to persuade a large number of northern West Virginia operators to sign wage agreements with their organization.

The principal feature of the wage agreement signed by the mine companies, according to Van A. Bittner, union representative, are:

Wage scale of 30 cents a ton for loading machine coal and 38 cents a ton for loading pick coal.

Inside day wage on $3.60 basis of eight-hour day.

Outside day wage on $3.20 day basis for eight-hour day.

Check weighman on every tipple, member of union.

Check off up to $1.50 a month for local and district union dues and assessments, exclusive of $1 initiation when necessary or any international assessment which may be made.

Conferences every sixty days during the term of contract between miners and operators to discuss business tendencies and alter wage agreements, if found feasible.

No discrimination against any miner because of age, so long as he is physically able to do the work.

Agreements to participate in joint conferences for settling problems of the industry and stabilizing the coal industry.

Complete unionization of all mines.

Coal-Mine Fatalities in May

Accidents in the coal mines of the United States during the month of May caused the death of 105 men, according to reports received from state mine inspectors by the Bureau of Mines. This was a reduction of 16 from the 121 fatalities reported for the previous month of April, and a reduction of 43 from the 148 deaths which occurred in May, 1930. While the production of coal in May declined 3 percent, from the April output, the number of deaths was reduced 13 percent. Comparing May, 1931, with the same month last year, the number of deaths decreased 29 percent while production of coal decreased only 20 percent. There were 33,319,000 tons of coal mined in May of the present year, as compared with 34,178,000 tons in April, 1931, and 41,865,000 tons in May, 1930. The death rates based on these figures were 3.15 per million tons of coal produced for the present month as compared with 3.54 for April, 1931, and 3.54 for May, 1930.

Considering bituminous mines alone, a lower death rate was shown in May, 1931, than in either the corresponding month last year or in April of the present year, the rate being 2.44 per million tons, based on 69 deaths and 28,314,000 tons, as compared with 3.17 a year ago, based on 114 deaths and 35,954,000 tons; and 2.74 for April, 1931, based on 78 fatalities and 28,478,000 tons.

The anthracite mines in Pennsylvania had a death rate of 7.19 per million tons of coal in May, 1931, as compared with 5.75 for May a year ago and 7.54 for April, 1931. These rates were based on 36 deaths and 5,005,000 tons in May of

the present year; 43 deaths and 5,700,000 tons in April, 1931; and 34 fatalities and 5,911,000 tons in May, a year ago.

Reports made to the Bureau of Mines covering the first five months of the current year show that 634 lives were lost in the mining of 187,610,000 tons of coal in the United States. This indicates a death rate of 3.38 per million tons, an improvement over the record of a year ago when 877 men were killed and 225,358,000 tons of coal were produced, with a death rate of 3.89. Separated into bituminous and anthracite, the records for the first five months of 1931, were 2.78 and 6.93, respectively for bituminous and anthracite mines while those for the corresponding period in 1930 were 3.50 and 6.61, respectively.

One major disaster—that is, a disaster in which five or more lives were lost—occurred during May of the present year. This was an explosion at Mt. Carmel, Pa., which resulted in five deaths. The period from January to May, 1931, showed 4 major disasters which resulted in the loss of 46 lives. For the same period in 1930, there were 7 major disasters and 88 deaths. Based exclusively on these disasters, the death rates were 0.245 for 1931 and 0.390 for 1930. The major disasters thus far in 1931 occurred at the rate of 2.13 separate disasters (as distinguished from the number of deaths resulting from the disasters) for each hundred-million tons of coal mined, as compared with 3.11 for the corresponding period in 1930.

Comparing the accident record for the first five months of 1931 with that for 1930, a reduction is noted in the death rates from falls of roof and coal, haulage, gas or dust explosions, explosives, and electricity, which are the principal causes of fatalities in coal mines.

Pennsylvania First-Aid Meet Not to Be Held

The annual first-aid meet, sponsored by the State Department of Mines for the benefit of the bituminous coal field of Pennsylvania, will not be held this year, the department has announced. The decision to forego the contest was influenced by a number of considerations, not the least of which are the economic conditions which have adversely affected the mining industry as well as all other industries.

The holding of such a meet, the department said, entails considerable expense and necessitates the services of more than 100 experts in first-aid work to act as judges. These men come from all parts of the state and adjoining states at their own expense or the expense of their employers, as there are no funds from which services of this kind can be paid.

The industry is also burdened with the extra expense of training, transporting and maintaining the members of their first-aid teams, and this expense is more burdensome than usual at a time of business depression, it was pointed out. The department believes that there will be sufficient improvement in economic conditions by next year to warrant the holding of the meet. The department will take an active part in many local first-aid meets to be held during the summer in various parts of the state.

Bubb Heads Colorado and New Mexico Operators

At the annual meeting of the Colorado and New Mexico Coal Operators' Association held the latter part of June at Denver, Colo., H. H. Bubb, general superintendent, Cokedale plant, American Smelting and Refining Company, Cokedale, Colo., was chosen president and Douglas Millard, manager, Fuel Sales, Colorado Fuel and Iron Company, Denver, vice president. F. O. Sandstrom was re-elected secretary, treasurer and traffic manager. The new board of directors of the Association is comprised of Messrs. W. D. Brennan, H. H. Bubb, G. C. Davis, Geo. B. Dick, Douglas Millard, P. E. Rinehart, B. W. Snodgrass, L. C. White, F. R. Wood, N. C. Anderson and L. G. Carlton. The meeting adopted a resolution commending the safety program of the National Coal Association.

Col. W. M. Wiley Dies

Colonel William M. Wiley was fatally stricken June 26 at the funeral of his wife at Sharples, W. Va. He was 67 years of age and at the time of his death was vice president and general manager of the Boone County Coal Corporation, Sharples, W. Va. Mr. Wiley was past president of the Kanawha Coal Operators' Association and one time head of many cooperative endeavors throughout the country. He was elected a director of the United States Chamber of Commerce in 1928, representing the Third Election District, and in 1930 and 1931 he was elected and reelected vice president of the Chamber with jurisdiction over southeastern section activities. In his work with the Chamber he most ably furthered the interests of the bituminous coal industry. Mrs. Wiley passed away on June 24 after a protracted illness.

Dr. S. W. Parr Dies

Dr. Samuel Wilson Parr, professor emeritus of practical chemistry at the University of Illinois, died May 16 of heart disease. He was 74 years old. Dr. Parr had been with the University of Illinois since 1891, and was recognized as one of America's leading authorities on the chemistry of coal. His contributions to chemistry were many, including the discovery of illium, a substitute for platinum. The method devised by Dr. Parr for determining the heat value of fuels is in wide use both in this country and Europe. He also perfected an improved type of calorimeter for determining and recording the heat values of combustible gases, and contributed much to research.

P. N. Guthrie, Jr., president of the Reading Iron Company, has announced the election of Myron H. Clark as vice president of the company in charge of operations. Until this election, A. J. Maloney, president of the Philadelphia & Reading Coal & Iron Company, which owns the Reading Iron Company, has had charge of the iron company's operations. Mr. Clark was formerly assistant to the president of the Crucible Steel Company.

A. T. Shurick, consulting mining engineer, 1775 Broadway, New York City, has been appointed consulting engineer of the United Electric Coal Companies. Mr. Shurick is well known in the coal trade and is the author of a coal-graph book covering both anthracite and bituminous.

David Doughton, who has been with the Hudson Coal Company, Scranton, Pa., for the past 33 years, has been appointed to the position of manager of the Combustion Service Department. The creation of this position and the extension of the combustion department was made necessary because of the increasing demands for this service.

J. W. Bischoff, general superintendent of the West Virginia Coal & Coke Corporation, has resigned and has been succeeded by M. L. Tuck, of Johnstown, Pa. Mr. Tuck was formerly general superintendent of the Cosgrove-Meehan operations around Johnstown.

John A. Howe, formerly president of the Carnegie Dock & Fuel Company, Minneapolis, Minn., has been appointed executive vice president of the Truax Traer Coal Company. Mr. Howe's headquarters will be in Chicago.

More than 60,000 tons of new lead will be utilized in the manufacture of cables to be installed by The New York Edison System in its underground transmission and distribution system in the 10 years, 1931 to 1940, inclusive, according to information supplied the Lead Industries Association by the company. New cable to be installed in this period will have approximately 80,000 tons of lead sheathing. Old cable to be retired has about 18,000 tons of lead sheathing.

Tariff Commission to Investigate Feldspar Costs

The Tariff Commission has instituted investigations for the purposes of determining the differences in costs of production of feldspar, crude and ground, and sponges, as between the United States and foreign countries.

The request for the investigation into crude feldspar comes from the Consolidated Feldspar Corporation, East Liverpool, Ohio, and asks a decrease in duty. The application on sponges was made by Henry Freirich, doing business under the name of "World Sponge Market," of New York City. A decrease in the rate of duty was requested.

Anthracite Service Opens 7th 5-Week Sales-Service School

The seventh Five-Weeks Sales-Service School of the Anthracite Service for coal merchants and their representatives was opened at the Anthracite Institute Laboratory at Primos, Pa., on June 8, with an enrollment of 31 sales representatives from the retail coal trade, the largest single class since the initiation of the school a little over a year ago.

The present class at the Sales-Service School draws upon four sections for its enrollment, namely, Pennsylvania, New Jersey, District of Columbia and New York. Since the inauguration of the school on May 26, 1930, 105 representatives of more than 100 retail coal companies throughout the anthracite consuming area of the country have completed the course of training. Upon the completion of the present school now in session, this total will have been increased to 136 representatives.

Applications for enrollment in the next Five-Weeks School of the Anthracite Service are being received daily, and to date total 21. It is expected that the next school will begin on July 20.

The Five-Weeks Sales Service School of the Anthracite Service is the outgrowth of a series of lectures worked up by the Anthracite Service about five years ago at the suggestion of retail coal merchants. The subjects of the original lectures covered the burning and servicing of anthracite, the equipment for its consumption, and briefly competitive fuels and means of meeting competition.

These lectures met with such success and popularity in the retail trade that a Dealers' Service School was inaugurated in Trenton, N. J., in October, 1926. This school consisted of 10 lecture courses. To date approximately 3,000 representatives of the retail coal trade have completed these dealer service classes.

With the sales efforts of competitors becoming more intensive in the succeeding years, it was considered advisable that a more complete course should be worked up. This resulted in the Anthracite Service working up the Five-Weeks Sales Service School. As a direct result of the training in the Sales-Service School, many retail coal companies have been able to make remarkable increases in sales. The constantly growing appreciation in the retail coal trade of the training afforded by the school is reflected in the increasing number of applications, unsolicited, being received for enrollment in the school by the Anthracite Service from retail coal merchants in all sections of the anthracite consuming area of the country.

T. H. Butler Heads Rocky Mountain Institute

An excellent three-day meeting was held by the Rocky Mountain Coal Mining Institute in Denver, June 3, 4 and 5, with an attendance of over one hundred and twenty. Many interesting papers on subjects dealing with mining, loading, shipping and kindred problems of coal producers were given, and the operation

T. H. Butler

of the newest equipment was illustrated by motion pictures taken in well equipped mines throughout the country.

Thomas H. Butler, superintendent of the Rock Springs Mines of the Union Pacific Coal Company, was elected president, succeeding G. A. Kaseman of Albuquerque, New Mexico, president of the Albuquerque & Cerrillos Coal Company. Hal C. Marchant, president of the Pinnacle-Kemmerer Coal Company, Denver, was elected secretary to succeed Benedict Shubart who refused to run for re-election.

Vice-presidents to represent the four states in the institute were elected as follows: John H. Emrick, of the Sullivan Machinery Company, Denver, for Colorado; G. C. Davis, of the Phelps-Dodge Corporation, Dawson, N. M., for New Mexico; Carl Sinclair, of Salt Lake City, Utah, for Utah, and J. C. Rae, of Gebo, Wyo., for Wyoming.

Code of Ethics for Coal Adopted

A code of ethics relating to the buying and selling of bituminous coal has been formulated by the Contact Committee of the National Coal Association and the Fuel Committee of the National Association of Purchasing Agents. The code has been approved by the Board of Directors of the National Coal Association and by the Executive Committee of the National Association of Purchasing Agents. The code follows:

Preamble

Bituminous coal constitutes one of the most important factors of modern life. As a domestic fuel it is essential to the life, health and comfort of the people. As an industrial fuel it is indispensable for the maintenance of our manufacturing, mining and transportation activities.

The business of meeting the requirements of society for such a commodity should be on a dignified and stable basis. Such a condition is essential to the interests of society as a whole, no less than to those of buyers and sellers of coal. As an aid to the establishment and maintenance of such a condition the principles embodied in the following code of ethics are hereby recognized as socially desirable:

Fraud and Misrepresentation

Certain legal provisions affecting contractual relationships have been established as applying to all commercial transactions. Fraud and misrepresentation prevent the "meeting of the minds," which is essential to the validity of a contract. The terms of a contract once legally entered into must be scrupulously observed. In accordance with these principles the following practices are condemned:

1. The use by sellers of coal of analyses either entirely fictitious or applying only to exceptionally high grade portions of their product. The analyses should represent the coal as loaded. Where coal is sold on the basis of its analysis, it is the duty of the operator to make sure that every shipment substantially meets the requirements of the contract in that respect.

2. It is the duty of the operator to see to it that every shipment under a contract of sale is up to the standard set by the operator at the time of the sale with respect to size, cleanliness and other preparation.

3. It is the duty of the operator to meet all contract obligations regardless of changes in market conditions. If for any unavoidable reason he is unable to fulfill his contractural obligations, it is his duty to perform pro rata on all such contracts in the absence of specific provisions to the contrary in the contracts themselves.

4. Misrepresentation by buyers of coal as to the prices at which coal can be purchased from other sources, for the purpose of securing a favorable contract, is hereby condemned as a form of fraudulent misrepresentation.

5. A certain amount of variation from the standards established in a sales con-

tract is unavoidable. Such variations are sometimes beneficial and sometimes injurious to buyers. It is unethical for the buyer to take advantage of minor variations not injurious as an excuse for demanding price concessions or damages.

6. It is the duty of the buyer to carry out the provisions of any contract for the purchase of coal into which he may have entered, regardless of changes in market conditions.

7. The sale or purchase of coal for test purposes should be restricted to that actual requirement. Where a contract is in force, it is the mutual duty of the buyer and seller to see that the consumption of other coals for test purposes be restricted to periods during which contracts are under consideration, except through mutual consent of both parties under contract.

COMMERCAAL BRIBERY

Commercial bribery has been held by the courts to be illegal. Statements in disparagement of competitors, made for the purpose of securing business, whether legally actionable or not, are inconsistent with honorable business practices. Accordingly the following rules of conduct are endorsed by buyers and sellers of coal.

8. Neither buyers nor sellers of coal shall resort to any form of bribery of a competitor's employes for the purpose of obtaining information with respect to such competitor's business or interfering with competitor's business or hampering him in his activities.

9. Neither buyers nor sellers of coal shall resort to any form of bribery of employes of railroads or other common carriers for the purpose of obtaining information with respect to a competitor's business or in any way interfering with his activities.

10. Neither buyers of coal on the one hand, nor sellers on the other, shall resort to any form of bribery of the employes of those with whom they are doing business, for the purpose of acquiring secret information or for the purpose of obtaining new business or securing the continuance of patronage.

11. Neither buyers nor sellers of coal shall knowingly make false or misleading statements, either in writing or orally, respecting a competitor's reliability, efficiency, or financial responsibility.

12. Neither buyers nor sellers shall knowingly make false or misleading statements, either in writing or orally, respecting the character of a competitor's product, or concerning the quality of the coal bought or sold by him.

COAL SALES CONTRACTS

Coal is consumed for a variety of purposes and under many different conditions. Coal as produced presents many variations in physical and chemical qualities affecting its suitability for different purposes. Under many contracts coal is shipped over long periods of time and frequently in varying quantities. Therefore, terms of payment cannot be uniform. In view of all these possible sources of misunderstanding it is essential that a coal sales contract contain as clear and definite provisions with respect to these and other features as can be devised.

13. Buyers and sellers of coal unite in recommending the use of the standard sales contract formulated under the combined authorization of the National Coal Association and the National Association of Purchasing Agents. Any conditions of the contract not covered by that form should be set forth with equal clearness so that no misunderstanding as to the terms of the contract may exist.

14. Buyers and sellers unite in urging that any dispute arising as to questions of fact relating to performance under the contract be settled by amicable conferences between the parties at interest; and that where such amicable settlement cannot be reached, use be made of the arbitration machinery provided in the standard coal contract referred to above.

Trade Commission Reapproves Oil Code

The Federal Trade Commission has informed the American Petroleum Institute that on June 12, 1931, it took final action representing substantial reapproval of the trade practice rules embodied in the petroleum industry's National Code of Practices for Marketing Refined Petroleum Products.

W. R. Boyd, Jr., executive vice president of the Institute, which sponsored the code, has expressed the opinion that the action of the commission undoubtedly will be eminently satisfactory and agreeable to the marketing branch of the industry. Commenting, Mr. Boyd said:

"It will be remembered that the Federal Trade Commission, on July 25, 1929, promulgated 21 trade practice conference rules which were accepted by 16,000 marketers and which the petroleum industry adopted and put into effect as its National Code of Practices for Marketing Refined Petroleum Products. On February 3, 1931, we were notified that the commission had withdrawn its approval of 18 of these rules, had rewritten two and left intact only one of the original rules.

"The marketing branch of the industry met in Chicago early in March to consider the situation and determine what the petroleum industry should do about it. It was the consensus of opinion then that if an adequate explanation of each of the 21 rules and a thorough analysis of the practices and methods which each trade practice rule sought to condemn and prevent could be made clear to the members of the commission, that body would not hesitate to reverse itself and reaffirm its approval of the rules. Events now prove that this opinion was correct, for the final action is a substantial reapproval of the original rules."

Naval Oil

The actual working of the Government oil shale reserves in Colorado and Utah as a source of supply of oil for the Navy is "a matter which under present conditions, lies far in the future," according to officials of the Navy Department who are charged with administration of the oil and oil shale reserves. The Government holds 150,631 acres of oil shale lands, of which 91,464 acres are in Utah and the balance in Colorado.

Three oil reserves held by the Government in the West are estimated to contain 770,000,000 barrels of oil, of which 750,000,000 barrels are in reserves in California and 20,000,000 barrels in Wyoming.

The Navy does not expect to be able to hold in the ground its oil supply in one reserve in California, estimated to amount to 150,000,000 barrels, because of the drilling of wells by adjoining land owners and the necessity of the Government drilling wells in the reserve to save its oil. As to the 600,000,000 barrels in another reserve in California, the Navy says that the more unprofitable it can make it for adjacent land owners to start drilling, the longer it can expect to conserve the reserve. The Standard Oil Company of California, owning land adjoining the reserve, is described by the Navy as a "good neighbor," whose present policy is that of conservation, but which has to consider the interests of its stockholders. The Navy has a fund of $10,000,000 with which to drill offset wells should private holders develop their property adjoining the reserve.

Fuller's Earth in 1930

The fuller's earth sold or used by producers in the United States in 1930 amounted to 335,644 short tons, valued at $4,326,705, as announced by the Bureau of Mines, which has collected statistics in cooperation with the Geological Surveys of Florida, Georgia, Illinois, and Texas. This is an increase of 6 percent in quantity and a small increase in total value in comparison with 1929. Output was reported by 15 operators in 7 states in 1930, namely, Colorado, Florida, Georgia, Illinois, Massachusetts, Nevada, and Texas. Georgia was the leading producing state in 1930. Florida was second and Texas third, the latter taking over the rank held by Nevada in 1929. These three highest ranking states in 1930 produced 82 percent of the total output. The average value per ton of fuller's earth was $12.89 in 1930 compared with $13.64 in 1929.

Fuller's earth is a term used to include a variety of natural substances that possess the property of absorbing grease or clarifying, bleaching or filtering oil. The original use of fuller's earth was in the fulling of cloth, but little of it is now used for this purpose. It is used almost exclusively in the bleaching or filtering of mineral and vegetable oils and animal fats, more than 99 percent of the domestic output being used for these purposes in 1930; the remainder was used as a filler, a binder, for fulling cloth, etc.

WITH THE MANUFACTURERS

Dorr, Oliver Companies Unite

John Van Nostrand Dorr and Edwin Letts Oliver have announced a union of the businesses and assets of The Dorr Company and Oliver United Filters, Inc. This union was brought about on June 1 by the formation of a new company, to be known as Dorr-Oliver Corporation, under the joint management of Messrs. Dorr and Oliver.

Dorr-Oliver Corporation will function through its two, wholly-owned operating units, a new Dorr Company, Inc., and a new Oliver United Filters, Inc. Mr. Dorr and Mr. Oliver will head their respective companies and, with the aid of their present executive and technical staffs, will continue on behalf of Dorr-Oliver Corporation the businesses which they have individually initiated, organized and expanded so successfully in the past.

The businesses of the two uniting companies are of long standing and complementary. The Dorr Company occupies a leading position in the fields of agitation, classification and sedimentation through its equipment, built up around the original inventions of its founder, Mr. John V. N. Dorr; and the Oliver United Filters, Inc., occupies a similar position in the field of filtration through the inventions of Mr. Edwin L. Oliver and Mr. E. J. Sweetland. The union should, therefore, make it possible to offer to industry a more complete line of equipment and engineering service than either company could hope to offer individually.

The growth and success of The Dorr and the Oliver united businesses have been due, to a great extent, to constructive policies of constant development and research and a broadening of fields of usefulness in anticipation of the constantly changing needs of the basic industries which they serve. Their fields are related so closely from a technical standpoint that the joint use of technical information and the carrying on of joint research and development is expected to result in more effective development and improvement of the equipment and processes which they have contributed to industry.

Both companies have built up technical staffs and manufacturing facilities at strategic locations throughout the world for the carrying on of their businesses, which have grown to international proportions. The common use of these established facilities should give fuller, prompter and more effective service to clients.

The two companies have frequently cooperated on the same projects, and, in many instances, the equipment of both is used at different stages of operation in the same plant. The founders of both companies have enjoyed a friendship extending over almost a quarter of a century, and the long acquaintance of many members of the staffs has prepared them for effective cooperative effort.

Under the union of interest now effected, there will be preserved to clients the close relations which they now enjoy with the respective staffs of the old organizations.

J. A. Malady, 406 Empire Building, Pittsburgh, Pa., formerly with the Hillman Coal & Coke Company, has been appointed agent for the Central Foundry Company (Universal Pipe Division) and the Scranton Pump Company.

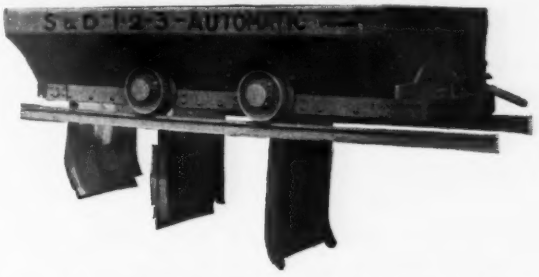
Ludlow-Saylor Celebrates Diamond Anniversary

The Ludlow-Saylor Wire Company, of St. Louis, is the latest among America's important industrial establishments to complete three-quarters of a century of continuous operation. They are receiving congratulations on their diamond anniversary from customers and friends throughout the country.

Frank Low, vice president and general sales manager of the company, and Edwin J. Gould, vice president and general superintendent in charge of operations at the large, wire-cloth plant on Newstead Avenue in St. Louis, were honored June 1 by their fellow workers with many floral tributes and other expressions of esteem on the occasion of their fortieth and fiftieth aniversaries in the service of this St. Louis enterprise.

On June 1, 1931, Mr. Low completed 40 years as an officer of the Ludlow-Saylor Wire Company, and Mr. Gould completed 50 years in their service.

Mr. Low came to St. Louis as secretary and treasurer of the company in



Sanford-Day's New Automatic Dump Mine Car

A new drop-bottom mine car, known as the 1-2-3 automatic, is being manufactured by the Sanford-Day Iron Works, of Knoxville, Tenn. This is the car which was exhibited at the American Mining Congress Exposition in Cincinnati recently.

The door openings are 5 in. wider than those on the old cars, and the capacity of the car is much larger for the same over-all dimensions. The doors drop in the 1-2-3 order, just the reverse of the dumping method of the old cars. This, it is claimed by the manufacturers, reduces breakage to the absolute minimum. They state that in breakage alone the new design should save 5 cent a ton as compared with the old cars with their 3-2-1 order of dropping doors.

The doors have double the lap of the old ones, hence can not push through, and are equipped with a new safety latch bar. This assures the doors dropping only at the coal bin, since they can not fall unless both ends of the latch bar are raised 3 in. simultaneously.

Another important feature is that the doors are removable without removing any bolts, nuts, pins or cotters. The axles, too, are removable without disturbing the pedestal boxes and without cutting a rivet or removing a bolt.

1891, to take charge of the sales, and has served continuously for 40 years as head of the sales department. He was elected vice president of the company about 1896.

Mr. Gould entered the employ of the company in 1881 and was advanced from one position to another until his appointment as general superintendent of production of what has become one of the largest enterprises in the world devoted exclusively to the weaving of wire cloth and screens.

It is interesting to note that the personnel and working forces of the Ludlow-Saylor Wire Company are composed of a number of men who have been in the employ of the company continuously for 25 to 40 years, and anyone who has been in the wire cloth business only 10 years is considered a baby in this big industrial family.

Small Generator Units and Their Application

Small Generator Units and Their Applications, a new 12-page publication identified as Circular 1908, is announced by the Westinghouse Electric and Manufacturing Company. In it are described four different types of generators used where a small amount of electrical energy is necessary, but where no central station supply is available. These generators are discussed first from an apparatus and then from an application standpoint. Fifteen kilowatts is arbitrarily chosen as the limit of the small generator class.

The four types of generators described are: belt-driven generators, turbine-generator units, portable gas-engine-driven power units, and electric service plants (internal-combustion-engine-driven generators which are connected in parallel with storage batteries and the loads). On the last page appears a table of specifications covering the various sizes of each type of generator.

The publication includes information concerning the following applications of these generators: outdoor construction, marine, small industrial plants, central stations, and emergency lighting.

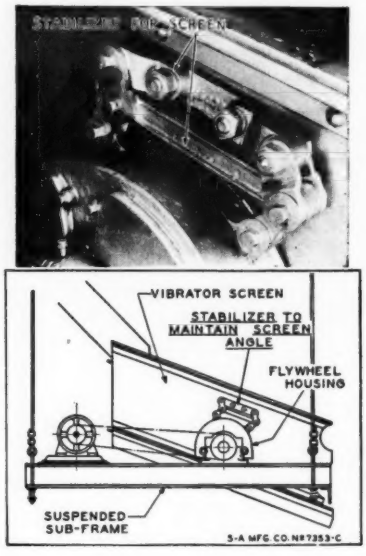
New Union Chain Coast Representative

In a move designed to improve the service to users of its product on the Pacific coast, The Union Chain & Mfg. Co., Sandusky, Ohio, has recently announced the appointment of the Industrial Gear & Machine Works, 225 Sixth Avenue, Oakland, Calif., as exclusive distributors for its line of industrial chain products in that territory. The principals of the western company are W. I. Brown and P. E. Haultain, who will handle sales.

New Stabilizer for Vibrating Screens

A unique stabilizer mounting for vibrator screens has been announced by Stephens-Adamson Mfg. Co., of Aurora, Ill.

In place of the usual balancing springs at the four corners of the screen a simple stabilizer unit is now mounted upon one side of the frame to hold the screen at an unchanging angle. The screen is free to vibrate with the eccentric vibrating shaft, but it resists the usual



tendency to rock or swing out of the proper screening angle.

The stabilizer consists of two pairs of short arms, jointed elbow fashion and held parallel by a rigid cross bar. One end of each arm pivots on the flywheel housing, which is rigidly fastened to the heavy steel subframe. The other end of arm is shackled to the screen body as shown in the accompanying illustration.

As can be seen, the two arms are free to swing or bend in any direction, *but both must bend and swing together.* In operation, the movement of the stabilizer is very slight. However, it effectively prevents the annoying tendency a vibrating screen has to buck and rock when sudden loads are received.

The principal advantages claimed by Stephens-Adamson engineers for the new stabilizer are:

1. The screen body is free to vibrate, but is held *positively* at the desired angle.
2. The screen angle is quickly adjusted to the most effective position by loosening two bolts on one side of screen.
3. The screen has no tendency to buck or rock.
4. Subframe vibration is decreased by eliminating the reaction of the usual balancing springs.
5. The stabilizer is sturdy and durable. All arms and brackets are of cast steel and the hinge pins are equipped with Nathan automatic oil feeders, which feed oil under constant pressure to the moving surfaces, one filling of oil lasting for several weeks.

Vertical Spiral Bevel Gear Speed Reducer

A new type of speed reducer, the vertical spiral bevel type, is announced by the D. O. James Manufacturing Company, Chicago.

This unit features smooth, noiseless operation and several novel advantages of design. The gears are made of chrome nickel of spiral bevel type to secure greater efficiency from the improved tooth form, which provides more teeth in constant contact and a greater tooth bearing or pressure area in each tooth of given size.

Shafts are made of 40 carbon steel and roller bearings are provided on both drive and driven shafts. Where large ratios of reduction are required, this type of reducer is made integral with a planetary reduction unit, so that all ratios from 8 to 1 to 1,600 to 1 are available. They are made in sizes from ½ to 100 hp.

A well-designed housing prevents oil leakage and keeps dust and dirt from filtering into the unit, forming a neat, compact drive for use whenever vertical (up or down) driving is required.

Great Western Publishes Annual Flotation Index

Great Western Electro-Chemical Company of San Francisco, manufacturers of Xanthate flotation reagents, have published their 1931 index of literature on the field of flotation.

The publishers announce that this year's index contains all the information published in the 1930 edition as well as the listings of current flotation literature published by the leading mining magazines, the U. S. Bureau of Mines, the American Institute of Mining Engineers, American Mining Congress, and various mining schools throughout the United States. The index is provided with a durable loose-leaf binder so that the editions of ensuing years may be added. No charge is made for copies.

Ohio Brass Company Pittsburgh Office Moves

The Pittsburgh office of the Ohio Brass Company announces a change in location from the twentieth floor of the Oliver Building to the nineteenth floor of the same building. The new room numbers are 1918 and 1919. Telephone numbers remain unchanged.

New Cleaning Plant Construction

The following new contracts have recently been closed by Roberts and Schaefer Company, of Chicago:

Buckeye Coal & Coke Company, Devils Fork, W. Va. Hydro separator coal washing equipment for washing and sizing egg, nut and stove coals. Capacity 100 tons per hour, to be completed August 1, 1931.

Lamar Colliery Company, Algonquin, W. Va. Hydro separator coal washing equipment for washing and sizing egg and nut coal. Capacity 100 tons per hour, to be completed August 1, 1931.

Pond Creek Pocahontas Company, Bartley, W. Va. Complete hydro separator coal washing plant, for washing and sizing stove, pea and slack coals. Capacity 190 tons per hour, to be erected at No. 3 mine, Bartley, W. Va. Completion, September 15, 1931.

Clover Fork Coal Company, Kitts, Ky. Complete 5-track Marcus steel tipple with automatic cagers and dumping equipment, Marcus picking table screen and RandS loading booms. Capacity 250 tons per hour. Completion, October 1, 1931.

New Type Oxwell Goggles

The Linde Air Products Company, 30 East Forty-second Street, New York, has recently introduced a new type of welders' goggles, designated as Oxweld No. 12 goggles. This improved type embodies features never before found in safety appliances of this kind.

Absolute comfort is assured since they are designed to fit the eyes and are adjustable to conform to the nose. The edge of the cup coming in contact with the face is shaped to conform to the general contour of the welder's cheekbone and nose, thus fitting smoothly around the eyes.

Patented ventilation ports on each side of the eye-cups are so constructed that it is impossible for sparks or light to reach the inside of the cup.

The field of vision has been increased by the use of 50 mm. diameter lenses instead of the usual 47 mm. lenses. Brown color lenses, known as the "B" type, are available, as with older type goggles, and, in addition, a new special quality green lens, known as the "A" type, is available in three different shades. Lenses may be easily changed by simply removing the metal cups, which unscrew from the frames of the eye-pieces.

Two New Marion Shovels

The Marion Steam Shovel Company, Marion, Ohio, have two new offerings in their shovel line—the type 4120 3- cu. yd. electric, and the type 450 gas or Diesel-electric. The type 4120 is specially designed for quarrying, open-pit mining and heavy construction work. Of the many features incorporated in this new Marion, eight stand out: (1) Single reduction herringbone gears for hoisting; (2) Herringbone first-reduction gears for rotating; (3) Triple hitch to dipper for hoisting cable; (4) Dipper handle carried between boom members; (5) Crawler pads and tumblers of manganese steel; (6) Enclosed non-clogging, continuous tread crawlers; (7) Boom length proportioned for maximum digging effort; (8) Easily convertible into clamshell or dragline excavator.

The type 450 is of 1¼-yd. capacity, powered with either a gas or a Diesel engine, direct connected to a generator supplying current to the three independent motors for hoisting, crowding and rotating.

Bulletin No. 346 describing the type 4120 and No. 347 covering the 450 gas or Diesel-electric may be obtained from the company upon request.

Transfers Explosives Plant

The explosives manufacturing operations of the Emporium, Pennsylvania, plant of the Hercules Powder Company, will be transferred to the company's largest plant at Kenvil, N. J., it is announced by Hercules officials.

Recently developed economies and the more advantageous location of the Kenvil plant in relation to raw materials and shipping facilities are responsible for the change, according to the official announcement. The consolidation is to be completed before August 1, and a number of the employes of the Emporium plant are being transferred to Kenvil.

Manufacturing facilities at Emporium will be maintained with a view to future requirements.

H. A. Jackson, president of the Chicago Pneumatic Tool Company, 6 East Forty-fourth Street, New York, announces the election as executive vice president of W. L. Lewis, who for the past year has been vice president in charge of finance of this company and was formerly assistant comptroller of the Bethlehem Steel Corporation.

Welder Designed to Operate on Higher Currents

Frequent cases are encountered in mining practice where the normal 250-volt trolley current is as high as 300 volts near the substations and power houses. It is not uncommon that bonding takes place within such zones of high power, and it frequently happens that repair shops where welding is done are fed by this higher voltage.

To meet the needs of mine-welding crews the Ohio Brass Company, of Mansfield, Ohio, has developed a 300-volt resistance welding machine to augment the regular 250-volt model. This has been the result of numerous requests from the field for such a device.

All of the features of the previous welding machines have been retained in the 300-volt model, which is designed to deliver service under the hard conditions met in mining practice.

Saunders Leaves Morse Chain Company

C. L. Saunders, general advertising manager and purchasing agent of Morse Chain Co., Ithaca, N. Y. (recently merged with the Borg-Warner Corp., Chicago, Ill.), has retired, leaving the company April 1. Over 14 years ago Mr. Saunders took charge of Morse Chain Co. advertising and publicity.

He was the organizer and one of the charter members of Ithaca chapter of the Association of National Advertisers, and has served as director of the Manufacturers' Division of American Mining Congress.

Three years ago he was elected director of the Purchasing Agents' Association of Syracuse and Central New York, affiliated with the National Association of Purchasing Agents. He has served as chairman of the Standardization Committee and for the past year has been chairman of the Commodity Committee.

Mr. Saunders, before his association with the Morse Industries of Ithaca, was for 10 years consulting engineer and general contractor, Cleveland, Ohio. He served for seven years the National Carbon Co., Cleveland, as consulting and research engineer, having charge of the designing of buildings and equipment of the Highland Avenue plant as well as the coordination of the equipment and

manufacturing policies and standards of their several plants.

Mr. Saunders, who is 65 years old, is a graduate of Case School of Applied Science, and a member of several engineering societies. He received the "Diplome de Medaille de Bronze," Exposition Universelle de 1900, Paris, France, for his work on "Carbon." His future plans have not been announced, other than an extended vacation, and then resumption of his work as consulting, merchandising, and purchasing engineer, specializing on reports of mechanization.

Bearing Handbook Published

"Ball and Roller Bearings—A Handbook for Designers and Engineers," a book upon ball thrust and radial roller bearings, has just been published by the Aetna Ball Bearing Manufacturing Co. This book, the ninth edition of their catalogue, consists of 68 pages. A number of interesting applications of thrust and roller bearings, together with typical mountings for both types of bearings are shown. A number of valuable formulas are presented for calculating horsepower, torque, the end thrust of worms and gears, etc. The complete line of Aetna thrust bearings, retainers and roller bearings are given in condensed form, including their load carrying capacity at various speeds, together with three complete series of roller bearings for light, medium and heavy duty. The book, especially designed for use by designers and draftsmen, measures only 4½ x 7½ in. Copies may be obtained by writing Aetna Ball Bearing Manufacturing Co., 4600 Schubert Avenue, Chicago, Ill.

A New Cable Guide for Gathering Reels

A major improvement has recently been made by Westinghouse engineers in the design of the cable guide for gathering reels on 250- and 500-volt Baldwin-Westinghouse mine locomotives. The design of this new guide differs from previous designs in that it is of a three-piece construction, consisting of a hardened metal center and two outer Micarta insulating rings, whereas former designs were constructed as a unit.

The inner or center portion of the cable guide is the only wearing part. The construction of this new guide makes it possible for the operator to replace the hardened metal center without discarding the entire guide, thereby reducing maintenance costs.

The wearing portion of the guide maintains a polished surface throughout its life, thereby eliminating the abrasive action and increasing cable insulation life.

Spiral Welded Pipe Handbook Published

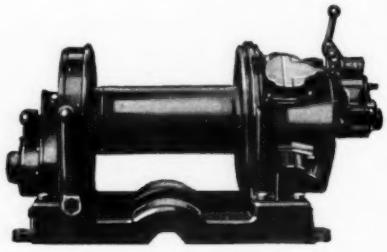
The American Rolling Mill Company has just published an attractive handbook on Armco spiral welded pipe, which contains specific information helpful to the users of specially designed pipe requiring a range of diameters from 6 to 24 in., and a variety of wall thicknesses.

It describes the spiral welding process and its economies; contains size, weight, and pressure tables; discusses the various types of coatings, couplings, joints, fittings, and flanges. There are also tables for converting pounds pressure per square inch into feet head of water, and vice versa, information on car loadings, and complete specifications for spiral welded pipe.

This book contains 40 pages, 8½ x 11 inches, and is profusely illustrated. Copies will be supplied upon request.

New Size "Utility" Hoist

Ingersoll-Rand Co., 11 Broadway, New York City, has increased its line of "Utility" hoists through the addition of the size HUL. This unit has a longer drum and a greater cable capacity than any previous member of the line. It



provides for 2,900 ft. of ¼-in. cable, 1,400 ft. of ⅜-in., or 800 ft. of ½-in. Its rated working capacity at 80 pounds air pressure is 2,000 pounds at a rope speed of 120 ft. per minute. This rating is conservative and can be exceeded with safety.

This new hoist can be employed wherever a portable hoist is required. Among its many applications are skidding and hoisting timbers, handling tools and supplies, moving and spotting cars, single-cable slushing work, etc.

The HUL is similar in construction to the size HU and is ruggedly built. It has a low-air consumption and a high overall efficiency.

The air motor is a reversible, 4-cylinder, radial-piston type and is accurately counterbalanced. Ball or roller bearings are used throughout. A jaw-type clutch is provided for engaging or disengaging the motor with the drum. An external contracting type brake is used.

American Steel and Wire Now Makes Preformed Wire Rope

The American Chain Company, Inc., in its annual report to its stockholders, has announced that one of its subsidiaries, the American Cable Company, has concluded negotiations with the American Steel and Wire Company, a subsidiary of United States Steel Corporation, to manufacture preformed wire rope under a license agreement, the patents covering this material being owned by the American Cable Company. In addition the company has concluded license contracts for the manufacture of this material with the General Cable Company, and a number of domestic and foreign wire rope manufacturers.

In the manufacture of preformed wire rope the wires and strands are preformed and preshaped to the exact helical "lay" which they assume in the finished rope. The result is freedom from internal torsional stress. This factor, it is claimed, substantially increases the length of services.

Joins Dayton-Dowd Company

M. B. MacNeille has resigned from Fairbanks, Morse & Company and joined the sales organization of the Dayton-Dowd Company, manufacturers of centrifugal pumps, Quincy, Ill., and will act as western sales manager with headquarters in San Francisco.

Prior to his affiliation with the Dayton-Dowd Company, Mr. MacNeille was for 19 years connected with the pump division of Fairbanks, Morse & Company in the capacities of designing engineer on centrifugal pumps, chief engineer of the hydraulic division, and for the past six years manager of the pump division.

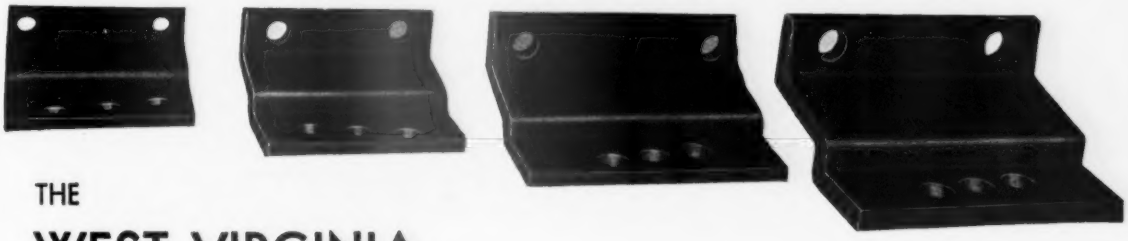
Squirrel Cage Induction Motor Publication

The Westinghouse Electric and Manufacturing Company, East Pittsburgh, announces the publication of Leaflet 20385-A, Type CS squirrel cage induction motors, which describes the new W-frame motor, which has interchangeable mechanical and electrical parts. Some of the many modifications and special applications of these motors made possible by the interchangeability of the parts are described and illustrated.

Stephens-Adamson Mfg. Company, conveyor and screen manufacturers of Aurora, Ill., have enlarged their Chicago office and moved to new quarters in the Civic Opera Building at 20 North Wacker Drive. C. H. Adamson, secretary of the firm, will be in direct charge of sales and engineering for the Chicago territory.

ADJUSTABLE SWITCH LUGS

A series of diagonal holes affords independent adjustment of each switch point with these switch lugs. There is no need to put washers behind lugs, stretch switch bars or use other makeshift means to make switch points fit tightly against the stock rail. Rolled to exact shape these lugs are absolutely interchangeable. They are furnished as standard equipment on all of our switches. Our catalog is full of suggestions for simplifying your track work and making it more efficient. Write for it, it is free.



THE
WEST VIRGINIA RAIL COMPANY

HUNTINGTON
WEST VIRGINIA

Rails and Accessories, Frogs, Switches, Steel Ties and Special Track Work in stock for prompt shipment.

SKULLGARD
The New Model M-S-A Protective Cap

Protects the SKULL from Injuries

Equipping your men with SKULLGARDS will largely eliminate Head Injuries and reduce Compensation Costs. Due to the low price and long life, it costs no more to wear one of these comfortable SKULLGARDS than the ordinary type of cap or hat—and in addition have the Protection which SKULLGARDS afford. Complete details on request. Write for Bulletin No. 75.

Mine Safety Appliances Co.
Braddock, Thomas and Meade Sts., Pittsburgh, Pa.
"EVERYTHING FOR MINE and INDUSTRIAL SAFETY"

CUT your *production costs* for profits

Let Robinson check over your mine ventilating fans. A line from you will bring some interesting data showing how your power bills can be reduced.

ROBINSON
VENTILATING CO.
ZELIENOPLE - PENNSYLVANIA

AMERICAN STEEL & WIRE COMPANY WIRE ROPE

SO important is wire rope to industry—on excavating machines—on hoists—on elevators—and for a thousand and one purposes—that its users can afford only to specify a brand of proved dependability, economy and long life. Because of its outstanding records—and the known reliability of its maker—American Steel & Wire Company American Wire Rope will be found on most equipment where service requirements are severe.

Made by the Largest Wire Rope Manufacturer in the World

The illustration shows American Wire Rope in use on the world's largest electric shovel.

1831 COMMEMORATING 100 YEARS of PROGRESS in WIRE MAKING 1931

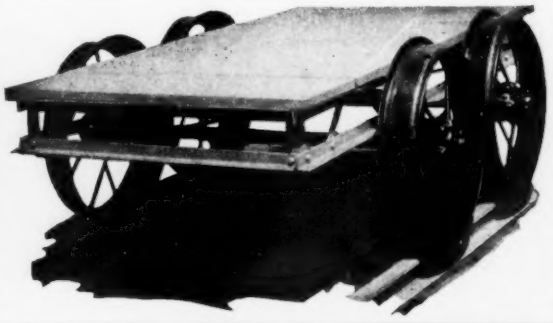
AMERICAN STEEL & WIRE COMPANY

SUBSIDIARY OF UNITED STATES STEEL CORPORATION

208 South La Salle Street, Chicago And All Principal Cities

Pacific Coast Distributors: Columbia Steel Company, Russ Building, San Francisco

Export Distributors: United States Steel Products Company, New York



LIGHT PUSH CARS

FOR TOOLS, DRILLS, etc.
APPROXIMATE WEIGHT 400 lbs.

EGYPTIAN MINE CARS,
TIMKEN EQUIPPED

SHAKER DRIVING EQUIPMENT
BALL FACE, SELF ALIGNING ECCENTRICS

REID SAFETY FROGS
WITH SWITCHES COMPLETE

EGYPTIAN IRON WORKS
DEPT. M—MURPHYSBORO, ILLINOIS
Write for further information and prices

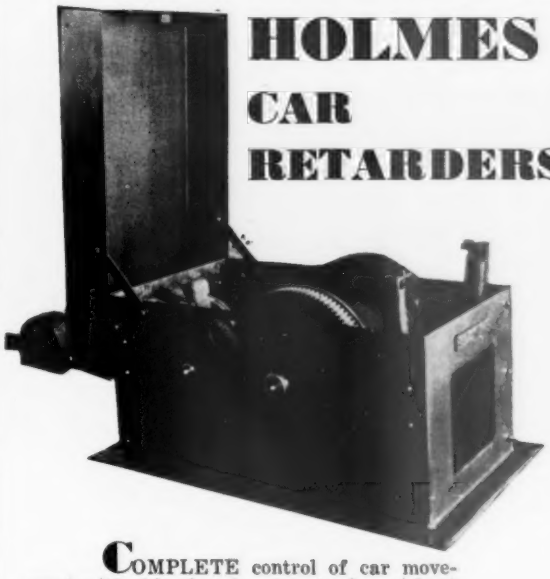
CARD-CARS

10 TONS AT ONE BITE!

A 160 cu. ft. capacity Granby Type ore car, equipped with 36" gauge, 20" diam. Card Semi-Steel *Molychro* Heat-Treated Wheels, roller bearing; 4¼" rd. axles mounted in spring pedestals.

Consult us, without obligation, about *your* car problems *Write for Catalog J.*

C.S. Card Iron Works Co.
Denver, Colorado.



HOLMES CAR RETARDERS

COMPLETE control of car movement with this electric car retarder without the use of chucks, brakes or extra manpower. Self-contained—no other parts or structure required. 300 ft. rope capacity. 300 f.p.m. rewind by separate control offers unusual advantages. No extra counterweights. Protected from elements and dirt. Cheap and easy to install. Other advantages described in bulletin. *Send for Bulletin No. 52*

Robt. Holmes & Bros., Inc.
DANVILLE, ILL.

AYER & LORD TIE CO.
A Division of The Wood Preserving Corporation
RAILWAY EXCHANGE
CHICAGO

Railroad Cross Ties — Timber Products — Lumber—Poles—Piling—Fence Posts Wood Treatments and Preservation

PLANTS
Carbondale, Ill., Grenada, Miss., Louisville, Ky., North Little Rock, Ark., Montgomery, Ala.; Marine Ways Paducah, Ky.

"Creosote Oil Prevents Decay"

Phelps Dodge Corporation
40 WALL STREET NEW YORK
MEMBER COPPER & BRASS RESEARCH ASSOCIATION

COPPER

ORVIS C. HOFFMAN, Pres. LEON H. HOFFMAN, Treas.
HOFFMAN BROS. DRILLING CO.
PUNXSUTAWNEY, PA.
DIAMOND CORE DRILLING
CONTRACTORS
PROSPECTING FOR ANY MINERAL. MORE THAN 20 YEARS EXPERIENCE. SATISFACTION GUARANTEED.

We Look Into the Earth
By using Diamond Core Drills. We prospect Coal and Mineral Lands in any part of North or South America.
Pennsylvania Drilling Co.
Pittsburgh, Pa.
Drilling Contractors

DIAMOND CORE DRILLING
CONTRACTORS
We make Borings for Coal, Clays and all Minerals. Up-to-date Equipment. Gasolene, Steam and Electric Outfits. Ask us for estimates.
MOTT CORE DRILLING COMPANY
HUNTINGTON, W. VA.

The YEARBOOK on COAL MINE MECHANIZATION

Carries the reports of the mechanization survey conducted by The American Mining Congress. There are discussions by authorities on safety, power, ventilation, and room and pillar recovery.

Reports of the survey include an outline of the latest developments in mechanical loading; descriptions of actual operations covering mechanical loading, conveyor mining and scraper mining; a study of the effect of mechanical loading on other phases of mining. $3.00 *per copy*, $2.50 *each in lots of 5 or more*. $5.00 *each in combination with a subscription to The Mining Congress Journal.*

THE AMERICAN MINING CONGRESS
841 Munsey Building Washington, D. C.

Stonehouse SIGNS, INC.
Stock and Special Signs, Codes, Etc., for Mines

INDEX TO ADVERTISERS

	Page
Allis-Chalmers Mfg. Co	8
American Steel & Wire Co	20
Atlas Powder Co., The	6
Ayer & Lord Tie Co	21
Card Iron Works, C. S	20
Connellsville Mfg. & Mine Supply Co	22
DuPont De Nemours & Co., Inc., E. I	9
Egyptian Iron Works	20
The Ensign-Bickford Co	Inside Front Cover
Enterprise Wheel & Car Co	22
Giant Powder Co., The	6
Hercules Powder Co	11
Hoffman Bros	21
Holmes & Bros., Inc., Robt	21
Jeffrey Mfg. Co	7
Joy Mfg. Co	10
Mine Safety Appliances Co	19
Mott Core Drilling Co	21
Ohio Brass Co	Back Cover
Pennsylvania Drilling Co	21
Phelps Dodge Corp	21
Radiore Co., The	22
Roberts & Schaefer Co	3
Robinson Ventilating Co	19
Roebling's Sons Co., John A	5
Stonehouse Signs	21
Timken Roller Bearing Co	18
Universal Vibrating Screen Co	22
West Virginia Rail Co	19

UNITED CLAY MINES CORPORATION

HIGH GRADE CLAYS OF ALL KINDS

GENERAL OFFICES TRENTON, N. J.

"We have been in business for a great many years and have gone through all the grief and trouble of unsatisfactory rolling equipment, and it gives us great pleasure, at this time, to say that since adopting Enterprise trucks all of this trouble has disappeared."

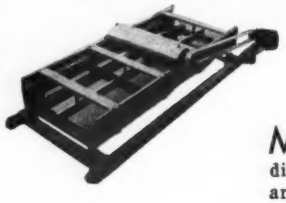
Other such blanket and specific commendations, with the reasons why, are in this book, "Lower Haulage Cost, Higher Net Profits." May we send it?

SALES AGENTS: Birmingham, A. J. Bowron; Denver, O. H. Davidson; Middlesboro, Rogan & Rogan Co.

ENTERPRISE WHEEL & CAR CORPORATION

Bristol, Va.-Tenn. Huntington, W. Va.

"WET or DRY material screening perfectly"



MATERIALS that give difficulty for many screens are handled easily and efficiently by Universals. Let us send descriptions that explain why.

UNIVERSAL VIBRATING SCREEN CO.

RACINE — — WISCONSIN

The RADIORE COMPANY Ltd.

GEOPHYSICAL EXPLORATIONS AND EXAMINATIONS

GENERAL OFFICES AND RESEARCH LABORATORY
9035 Venice Boulevard, Los Angeles, California

350 Bay St., Toronto, Canada 117 Liberty St., New York City

CONNELLSVILLE mine fans

Connellsville mine fan wheels are rigidly constructed and run in perfect balance. Electrically welded blades are shaped and set to give highest efficiency. Drives are belt, chain, rope or direct connection. Fans are built to meet any requirements and are of exhaust, blowing or reversible types.

Connellsville Fans combine high efficiency and sturdy construction with low installation and maintenance costs. Let us send further information.

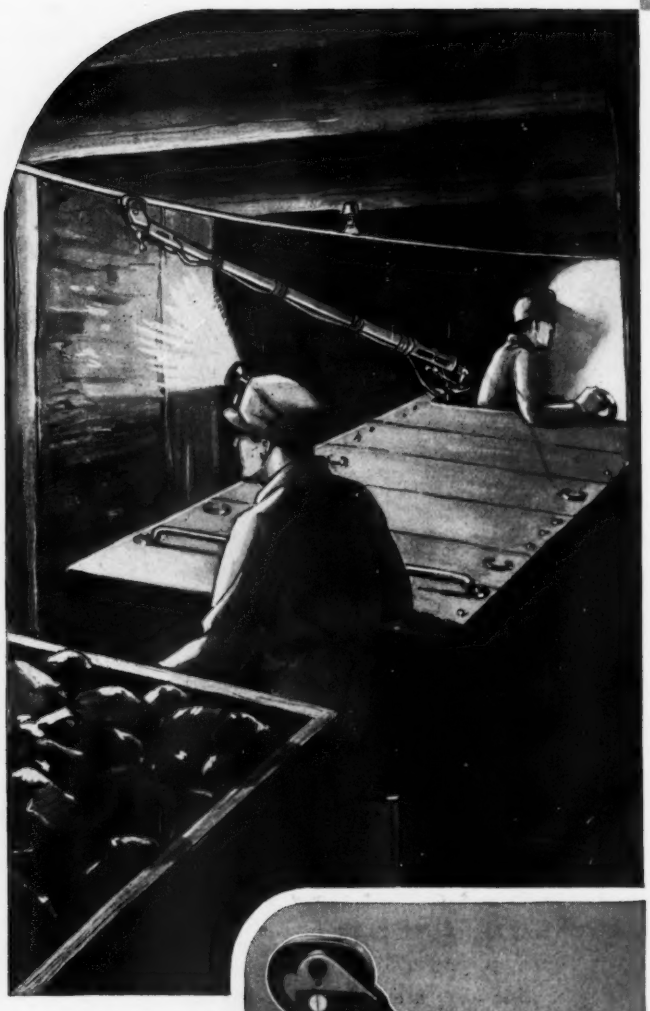
THE CONNELLSVILLE MFG. & MINE SUPPLY CO.
CONNELLSVILLE, PENNSYLVANIA

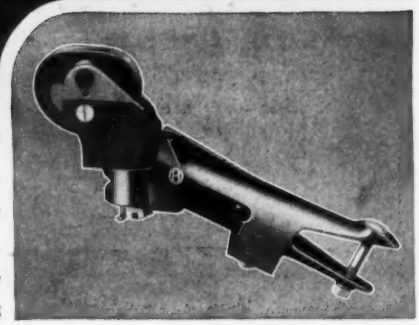
COPPER . . . and 1931

In no branch of the mining industry have the effects of present business conditions been felt more keenly than in Copper. In no branch today are modern production economies and methods of greater interest. For these reasons, both the copper executive and the practical operating man will find in the forthcoming COPPER NUMBER of the MINING CONGRESS JOURNAL material of the greatest importance and value. This issue will not only contain a complete review of the Copper Industry with an analytical survey of present production trends and prices, but it will also feature the properties of the Calumet & Hecla Consolidated Copper Company, including a detailed discussion of every operating department.

COPPER NUMBER
The Mining Congress Journal
OCTOBER · 1931

From 2 to 5 Times MORE COLLECTOR LIFE





O-B TROLLEY SHOE

This shoe has 2½ inches of contact surface. Made in either bronze or steel. Listed page 36, O-B New Products Supplement No. 4

THE HEAT, THRUST, and hard usage to which current collectors are subjected, when in service on heavy locomotives, hold no terrors for the O-B Trolley Shoe. When put into the same hard service which saps the life of trolley wheels, the O-B Trolley Shoe has given from 2 to 5 times more service. ◆ Pick out your heaviest locomotives upon which wheels burn out almost as fast as they are put on, and replace the wheels with O-B Shoes; then let the heat, the thrust, the hard usage come. This sturdy shoe will take the blows, and in payment for the small additional cost, will give 2 to 5 times more life. Ohio Brass Company, Mansfield, Ohio; Canadian Ohio Brass Co., Limited, Niagara Falls, Canada.

1374 M

KEEPING DOLLARS *from* WAITING ON DIMES

Ohio Brass Co.

NEW YORK PITTSBURGH CHICAGO CLEVELAND ST. LOUIS ATLANTA DALLAS
PHILADELPHIA BOSTON LOS ANGELES SAN FRANCISCO SEATTLE

PORCELAIN INSULATORS
LINE MATERIALS
RAIL BONDS
CAR EQUIPMENT
MINING MATERIALS
VALVES

XU